FEBRUARY, 1894. VOL. III. No. 2.

The Geographical Journal

INCLUDING THE PROCEEDINGS OF THE ROYAL GEOGRAPHICAL SOCIETY.

SUMMARY OF CONTENTS.

(*For Details, see over.*)

	PAGE
Kurdistan. By Captain F. R. MAUNSELL, R.A.	81
The Geography of Mammals. By W. L. SCLATER, M.A., F.Z.S.	95
Descriptive Notes on the Southern Plateau of Bolivia and the Sources of the River Pelaya. By CHARLES M. S. PASLEY	105
Two Books on Central Asia	115
The State of the Siberian Sea: The Nansen Expedition. By Captain JOSEPH WIGGINS	121
Commercial Geography. By HUGH ROBERT MILL, D.Sc.	124
Geography at the World's Columbian Exposition. By CHARLES T. CONGER, B.A.	130
Italian Explorations in the Upper Basin of the Jub. By E. G. RAVENSTEIN	134
Hydrography of the Eastern Mediterranean	138
The Monthly Record	140
Correspondence—The Determination of Longitudes by Photography. HENRY G. SCHLICHTER. The Sea Route to Siberia. J. GOLDSMITH PROCTER	150
Obituary—Sir SAMUEL WHITE BAKER. By E. G. RAVENSTEIN	152
Meetings of the Royal Geographical Society, Session 1893-94	156
Geographical Literature of the Month	157
New Maps	165
Maps and Illustrations.	

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL.
EDITED BY THE ASSISTANT SECRETARY.

LONDON:
THE ROYAL GEOGRAPHICAL SOCIETY, 1, SAVILE ROW;
EDWARD STANFORD, 26 AND 27, COCKSPUR STREET, CHARING CROSS, S.W.

[To Non-Fellows Price, 2s.

INDIA, CEYLON, JAVA, QUEENSLAND, BURMAH, PERSIA, EAST AFRICA, &c.

BRITISH INDIA STEAM NAVIGATION COMPANY, LIMITED,
BRITISH INDIA ASSOCIATION.

MAIL STEAMERS FROM LONDON TO

CALCUTTA.	BOMBAY.	BRISBANE.
MADRAS.	KURRACHEE.	BATAVIA.
COLOMBO.	BAGHDAD.	ROCKHAMPTON.
RANGOON.	ZANZIBAR.	TOWNSVILLE.
MAURITIUS.	MOMBASSA.	MARYBOROUGH.

For Dates see Daily Advertisements.

Delivering Mails, Passengers, Specie, and Cargo to all the principal Ports of INDIA, BURMAH, EAST AFRICA, QUEENSLAND, and JAVA.

Every comfort for a tropical voyage.

Apply to GRAY, DAWES, & CO., 13, Austin Friars, E.C., and 4, Pall Mall East, S.W.; or to GELLATLY, HANKEY, SEWELL, & CO., Albert Square, Manchester; 51, Pall Mall, and Dock House, Billiter Street, London.

H. SOTHERAN & CO.,

Booksellers, Bookbinders & Publishers.

GENERAL AGENTS FOR PRIVATE BOOKBUYERS & PUBLIC INSTITUTIONS

In India, the Colonies, America, and foreign parts.

A MONTHLY CATALOGUE of SECOND-HAND BOOKS: Specimen No. post free.

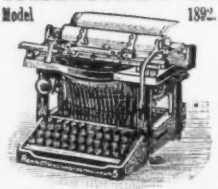
LIBRARIES PURCHASED OR VALUED FOR PROBATE.

Telegraphic Address: BOOKMEN, LONDON. Code in Use: UNICODE.

140, STRAND, W.C., & 37, PICCADILLY, W.

REMINGTON STANDARD TYPEWRITER.

Model 1892.



Used and endorsed as the best by twenty-five of the leading British Railway Companies after an exhaustive test by their principal Engineers.

UNEQUALLED FOR DURABILITY, RANGE OF WORK AND SIMPLICITY.

Contractors to

Her Majesty's Government.

WYCKOFF, SEAMANS & BENEDICT, 100 Gracechurch St. London, E.C.

MANCHESTER—84 Cross Street: BIRMINGHAM—23 Martineau Street: LEEDS—3 Cookridge Street; NEWCASTLE—10 Neville Street: LIVERPOOL—14c North John Street; EDINBURGH—1, North Street, David Street; GLASGOW—164 Hope Street.

The Geographical Journal.

Authors are alone responsible for their respective statements. In MS. communications all new or unfamiliar geographical names should be written in imitation of Roman type.

CONTENTS.—FEBRUARY.

PAGE

Kurdistan. By Captain F. R. MAUNSELL, R.A. 81
The Geography of Mammals. By W. L. SCLATER, M.A., F.Z.S. . 95
Descriptive Notes on the Southern Plateau of Bolivia and the Sources of the River Pelaya. By CHARLES M. S. PASLEY . 105
Two Books on Central Asia 115
The State of the Siberian Sea: The Nansen Expedition. By Captain JOSEPH WIGGINS 121
Commercial Geography. By HUGH ROBERT MILL, D.Sc. 124
Geography at the World's Columbian Exposition. By CHARLES T. CONGER, B.A. 130
Italian Explorations in the Upper Basin of the Jub. By E. G. RAVENSTEIN 134
Hydrography of the Eastern Mediterranean. 138
The Monthly Record 140

THE SOCIETY
Geography at Cambridge

EUROPE
The Forests of Abkhazia

ASIA
Chinese Map of Tibet
The North Siberian Expedition
Exploration in Siberia

AFRICA
A Journey up the Cross River
Determination of the position of Antananarivo

AMERICA
The Climate of British Columbia
Triangulation in the Argentine Republic
Patagonia

AUSTRALASIA
Damma Islands, Banda Sea

MATHEMATICAL AND PHYSICAL GEOGRAPHY
Temperature and Conductivity of Snow
The Daily Afternoon Minimum of Wind-force

GENERAL
Speed of Travelling in the Future
Cycling and Local Geography
Geography and the Army Entrance Examinations
The late August Artaria
Globus and Ausland
Olaus Magnus and his Map of Northern Europe

Correspondence—The Determination of Longitudes by Photography. HENRY G. SCHLICHTER. The Sea Route to Siberia. J. GOLDSMITH PROCTER 150
Obituary—Sir SAMUEL WHITE BAKER. By E. G. RAVENSTEIN . . . 152
Meetings of the Royal Geographical Society, Session 1893-94 . 156
Geographical Literature of the Month 157
New Maps 165

MAPS AND ILLUSTRATIONS.

Sketch-Map: The Basin of the Upper Jub 135
Sir Samuel W. Baker. (From a Photograph by MAULL & FOX, May 1866) 151
Kurdistan. By Capt. F. R. MAUNSELL, R.A. 168
Map of the World showing the Six Regions of the Geographical Distribution of Mammals 168

SOLD BY

PARIS: BARRÈRE.
VIENNA: ARTARIA & CO.
HAMBURG: L. FRIEDERICHSEN & CO.
ST. PETERSBURG: WATKINS & CO.
MANCHESTER: JOHN HEYWOOD.
EDINBURGH: DOUGLAS & FOULIS.
DUBLIN: HODGES, FOSTER & CO.
BERLIN: D. REIMER.
LEIPZIG: F. A. BROCKHAUS.
NEW YORK: SCRIBNER & SONS.
MELBOURNE: E. A. PETHERICK & CO.

For List of Council and Officers, Conditions of Admission to the Fellowship of the Society, and Society Notices, see pages ii. and iv.

ROYAL GEOGRAPHICAL SOCIETY.

PATRON.

HER MAJESTY THE QUEEN.

VICE-PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G., K.T., K.P., G.C.B., &c., &c.

Honorary-President.

HIS ROYAL HIGHNESS THE DUKE OF EDINBURGH, K.G., K.T., G.C.S.I., &c., &c.

COUNCIL.

(ELECTED 29TH MAY, 1893.)

President—CLEMENTS R. MARKHAM, C.B., F.R.S., F.S.A.

Vice-Presidents.

Hon. G. C. BRODRICK.
Sir JOSEPH HOOKER, K.C.S.I., C.B., F.R.S.
Sir JOHN KIRK, K.C.B., G.C.M.G., F.R.S.
W. T. BLANFORD, LL.D., F.R.S., F.G.S.
General R. STRACHEY, R.E., C.S.I., F.R.S.
Captain W. J. L. WHARTON, R.N., F.R.S.

Treasurer—EDWARD L. SOMERS COCKS.

Trustees—Right Hon. LORD ABERDARE, G.C.B., F.R.S.; Right Hon. Sir JOHN LUBBOCK, Bart., F.R.S., M.P.

Secretaries—DOUGLAS W. FRESHFIELD; H. SEEBOHM, F.L.S.

Foreign Secretary—

Members of Council.

Admiral LINDESAY BRINE.
Hon. G. N. CURZON, M.P.
Lieut.-Colonel JAS. CECIL DALTON, R.A.
Major LEONARD DARWIN, R.E., M.P.
FRANCIS GALTON, F.R.S.
Sir GEORGE D. TAUBMAN GOLDIE, K.C.M.G.
Major-Gen. Sir F. J. GOLDSMID, K.C.S.I., C.B.
General Sir T. E. GORDON, C.B., K.C.S.I.
WILFRED HUDLESTON, F.R.S., F.G.S.
General Sir W. DRUMMOND JERVOIS, G.C.M.G., C.B.
J. K. LAUGHTON.
GEO. SUTHERLAND MACKENZIE.
E. DELMAR MORGAN.
JOHN MURRAY.
ERNEST G. RAVENSTEIN.
Sir RAWSON W. RAWSON, K.C.M.G., C.B.
HOWARD SAUNDERS, F.L.S., F.Z.S.
Colonel H. C. B. TANNER.
General J. T. WALKER, R.E., C.B., F.R.S.
Colonel C. M. WATSON, R.E., C.M.G.
Colonel Sir CHARLES W. WILSON, R.E., K.C.B. K.C.M.G., F.R.S.

Assistant Secretary and Editor of Transactions—J. SCOTT KELTIE.

Librarian—H. R. MILL, D.Sc.

Map Curator.
JOHN COLES, F.R.A.S.

Chief Clerk.
S. J. EVIS.

Bankers—Messrs. COCKS, BIDDULPH, and Co., 43, Charing Cross.

Candidates for admission into the Society must be proposed and seconded by Fellows, and it is necessary that the description and residence of such Candidates should be clearly stated on their Certificates.

It is provided by Chapter IV., § 1, of the Regulations, that,

"Every Ordinary Fellow shall, on his election, be required to pay £5 as his admission fee, and £2 "as his first annual subscription, or he may compound, either at his entrance by one payment of £35, "or at any subsequent period on the following basis:—

Fellows of 20 years' standing and over	...	...	£12	10s.
„ 15 „ „ and under 20...		...	£16	
„ 10 „ „ „ 15...		...	£20	

"And no Fellow shall be entitled to vote or to enjoy any other privilege of the Society so long as he "shall continue in arrear."

All Subscriptions are payable in advance, on the 1st of January in each year.

The privileges of a Fellow include admission (with one Friend) to all ordinary Meetings of the Society, and the use of the Library and Map-room. Each Fellow is also entitled to receive a copy of **The Geographical Journal** and the **Supplementary Papers**, the former of which is forwarded, free of expense, to addresses in the United Kingdom, and the latter obtained on application at the Society's office.

Copies of the Regulations and Candidates' Certificates may be had on application at the Society's Office, 1, Savile Row, London, W.

ASPREY,

166, New Bond Street.

Travelling Bags in all the best forms.

SUIT CASES, 'COMPACTUS' DRESSING CASES.

ILLUSTRATED CATALOGUE FREE.

LONDON & LANCASHIRE FIRE INSURANCE COMPANY.

SUBSCRIBED CAPITAL, £2,127,500.

Special Features:

FIRE BUSINESS ONLY. ALL FUNDS AVAILABLE FOR FIRE CLAIMS.

No Life Business or Liabilities. Policy Holders incur no Liability.

LIBERAL SETTLEMENTS. PROMPT PAYMENTS.

Applications for Agencies Invited.

Head Offices:

45, Dale Street, Liverpool, and 74, King William Street, London.

THOMAS BLAND & SONS,

GUN AND RIFLE MANUFACTURERS.

RIFLES FOR BIG GAME SHOOTING.

NEW SPORTING RIFLE.

·303 Gauge. Metford Rifling, Magazine, and other systems.
Firing nickel-coated and soft-nosed expanding bullets. Immense velocity.
As supplied to E. A. MAUND, Esq.

THE "EQUATORIAL" RIFLE.

FOR ELEPHANT SHOOTING.
A self-ejecting Hammerless Rifle of great smashing power, using steel-pointed "Speke" bullets.
As supplied to HENRY S. GLYNN, Esq.

THE "EUOPLIA" BALL and SHOT GUN.

FOR FEATHER, FUR, and BIG GAME.
Shoots Ball and Shot from both barrels with equal accuracy. Barrels rifled throughout.
Used with great effect by JOHN TERRY, Esq., F.R.G.S.

EXPRESS DOUBLE RIFLES.

·577 Magnum Charges. As recommended by Sir SAMUEL BAKER.
Steadiness of shooting, flat trajectory, and little recoil.

430, WEST STRAND, LONDON.

Works: BIRMINGHAM.

CONTRACTORS TO H.M. WAR DEPARTMENT.

By Appointment to H.I.M. The Sultan of Turkey.

CONTRACTORS TO H.M. INDIA OFFICE.

ROYAL GEOGRAPHICAL SOCIETY.

NOTICES.

Hints to Travellers.—Ready.—The Seventh, revised, Edition of this work, edited, under a Committee of the Council, by Capt. W. J. L. Wharton, R.N., F.R.S. (Hydrographer to the Admiralty), and Mr. Douglas W. Freshfield, Sec. R.G.S.

Price Eight Shillings; to Fellows at the Office of the Society, Five Shillings.

Instructions for Intending Travellers, under the authority of the Council of the Royal Geographical Society.—Arrangements have been made for the instruction of intending Travellers in the following subjects:—

1. Surveying and Mapping, including the fixing of positions by Astronomical Observations. By Mr. John Coles, Map Curator of the Society. 2. Geology, including practical training in the field. By Mr. W. Topley, F.R.S., of the Geological Survey. 3. Botany. Under the direction of the Director, Royal Gardens, Kew. 4. Photography. By Mr. John Thomson, Author of 'Photographic Illustrations of China and its People,' and other works.

The Lessons are given on days and at hours arranged between the Instructor and the pupil.

The fee to pupils is, for each lesson of an hour, 2*s.* 6*d.*

Tickets for the lessons must be previously procured at the Offices of the Society.

Supplementary Papers.—Now Ready, Vol. III., Part V., containing Modern and Ancient Roads in Asia Minor. By D. G. Hogarth, and J. C. R. Munro (with Maps). This completes Vol. III.

*** Fellows can have their Copies by applying at the Offices of the Society, 1, Savile Row, W.

Evening Meetings.—Papers to be read at the Evening Meetings of the Society in February:—Monday, February 12th. Johore. By H. Lake. **February 26th.** Exploration on the Upper Mekong, Siam. By Herbert Warington Smyth.

Educational Lectures.—The Lectures on the Relations between History and Geography by Mr. H. J. Mackinder, will be continued on Thursday Evenings at 8 p.m., up to March 22nd, at the Royal United Service Institution. Admission to each Lecture, Sixpence.

Any Fellow resident in this country, desiring to have notice of the subjects of papers to be read at the Society's Meetings forwarded to him, can receive such notices by post on payment in advance to the Chief Clerk, at 1, Savile Row, of 2*s.* per session.

The
Geographical Journal.

No. 2. FEBRUARY, 1894. Vol. III.

KURDISTAN.

By Captain F. R. MAUNSELL, R.A.*

Although many travellers have passed through this portion of the Ottoman dominions, there is still a good deal of it the geography of which is but imperfectly known. Kurdistan is not an accurately defined province, but the expression may be used to define the extensive area inhabited by the Kurds. The north-western limit of this is the mass of rugged mountains of the Dersim country lying south of Erzingan, and filling up the space between the two arms of the Upper Euphrates previous to their junction. To the north the boundary lies along a line traced up the Frat Su Valley from Erzingan, through Erzerum and along the Russian frontier to Ararat. The greatest extent of Kurdistan is south-eastward, where it covers all the mountainous country contiguous to the Persian frontier as far south as a line drawn through Kifri, the Manisht Mountain, and Kermanshah in Persia. On the west the Kurds inhabit very little of the plain country of the Middle and Lower Tigris basin, and a line drawn from Kifri to Mosul and up the course of the Tigris to Diarbekr and on to Kharput and the Dersim country would mark the limit in this direction. On the east a considerable portion of the most fertile provinces of Persia are inhabited by Kurds; from Kermanshah northward through Sinna, and along the frontier mountains west of Urmia to Ararat marks the limit here.

It is only in Southern Kurdistan that the population is exclusively Kurdish, as north of Mosul there is a large Christian population in the country as well. These are of various sects, but principally Armenians, Nestorians, Chaldeans, and Jacobites. To the north and north-west the Kurdish element comes in contact with the more lethargic races of Osmanli descent, and in the Tigris Valley they meet the Arab tribes of the great deserts to the south-west. On the south the mass of the

* Paper read at the Royal Geographical Society, June 26th, 1893. Map, p. 168.

Manisht Mountain divides them from the grazing-grounds of the Faili Lurs.

The Kurdish subjects of the Shah are not looked upon with much favour, as they in common with the rest of Kurdistan profess the Sunni faith, while Persians are for the most part Shias, which means a very sharp and bitter dividing-line.

Not many years ago Kurdistan was a separate province, and Kurdish begs ruled in Amadia, Julamerk, Rowanduz, Suleimania, and other strongholds; but this state of things has now been altered, and the country is for the most part under the direct control of Turkish officials. There still remain mountain districts such as Dersim, Bohtan, and Modikan which form natural strongholds, and owing to the difficulty of getting at them the tribes remain almost entirely independent.

The original Kurdish organisation was undoubtedly tribal, and the prevailing habits of the tribes still remain nomadic and pastoral; but in a country and climate of so varied a nature there are many local circumstances which alter this.

On the upland plateaux lying between Lake Van and the Russian frontier, the winter climate is remarkably severe, and the Kurds have to remain in villages all that season, the distance being too great to migrate to a warmer plain-country. In the summer, however, the nomadic instinct shows itself, and the population of all the Kurdish villages turn out into their black tents, pitched either a short distance away, or on some convenient grazing-ground in the neighbourhood. The Armenian population on the contrary keep to the valleys, and are strictly agricultural and sedentary. On the steep impracticable slopes and deep ravines of the Dersim country the Kurds are perforce obliged to be sedentary.

In Central and Southern Kurdistan, the tribes have easy access to the plain country on either bank of the middle course of the Tigris, and here a large number are true nomads, living in tents all the year round. In the winter and early spring they pasture their flocks on the extensive plains on the Tigris right bank between Mosul and Jezire. These grounds have to be rented from the powerful Arab tribe of Shammar Tai, who roam over the country south-west to the Euphrates. As spring opens and the snow gradually clears off, they cross the river and ascend the hills. It is probably July before the snow permits them to encamp on the summits of the great ranges of Central Kurdistan. The formation of the country favours them, as the ascent to the higher ranges is fairly gradual, and they do not commence the ascent until the grass on the lower levels is consumed or withered.

In the religion of the Kurds, especially of the nomads, there exist under the outward forms of Mohammedanism traces of Pagan doctrines which probably descended to them from very early ages. Principal among these is the worship and making of vows paid at the tomb of some local

celebrity. One of these, the Ziaret or Shrine of Khalil Aghwar near Zakho, was of particular interest, as it lay on the road taken by the nomads in their annual wanderings. The tomb was hidden in the brushwood and under a heap of stones. Round it enclosing a space about 50 yards square was a low stone wall on which were set at intervals small green and white flags. Inside the wall was crowded with offerings, either propitiatory or otherwise, which the nomads had placed there as they passed by. Some of their black tents, tent-matting and cloths, tent-poles, and a couple of their brightly-painted cradles were among the articles I noticed, each of which was of considerable value to these people. On the branches of the trees which overhung the shrine were numerous rags and scraps of clothing which passers-by had tied there, each person imagining that by so doing they were leaving their ills and ailments there behind them. Round about was a fine grove of oaks which were well grown, as these trees are never touched for firewood. These isolated groves are often met with throughout Kurdistan, and are always treated with veneration, and the wood left untouched. As a general rule there is no control over the cutting of firewood, and much of the country which would otherwise be well wooded is almost denuded by reckless cutting and burning.

A heap of stones by the roadside to mark the spot where a murder was committed is also a roadside incident in some places, and each passer-by is supposed to add an additional stone to the pile. There are among the tribes a certain number of saints or holy men who possess considerable religious influence, and to whom the superstitious tribesmen pay almost idolatrous honours.

During my journey last summer I entered Kurdistan from the north, and left Erzerum on August 26th, 1892.

The road to Van round the north-east corner of the lake was taken, and lay over a bare and treeless country, but well watered and with plenty of pasture-land. The Bingeul Dagh, or Mountain of the Thousand Lakes, is a favourite grazing-ground in summer. This is a somewhat remarkable mountain and contains no prominent peak, but at the summit the sharply defined cliff which borders the old crater can be traced, and the rest is a long gradual slope cut up with numerous stream valleys edged with low basalt cliffs. At one period this region must have been a remarkable centre of volcanic disturbance. In this neighbourhood, also showing traces of having been at one period active volcanoes, are the Sipan Dagh, a solitary peak shaped like a truncated cone rising on the north shore of Lake Van, and the Nimrud Dagh on the west shore, which has a crater nearly 8 miles in diameter which contains now a number of hot springs and lakes. The Tendurek Dagh to the north-east also shows traces of lava streams and a large crater, and Ararat itself is also of volcanic origin. The

basaltic ravines on the slopes of the Bingeul and Sipan Mountains and the numerous fragments of obsidian which can be picked up close to the Sipan Dagh are further evidence of this. In the Hartoshi Mountains and the upper basin of the Great Zab River numerous sulphurous springs are to be met with. Some are hot springs, some give off sulphuretted hydrogen, and in others the pure sulphur can be gathered from incrustations round the edge of the springs. This is much prized by the Kurds for the manufacture of powder. In the country between Erzerum and Van the Kurds prefer the mountain districts, where they can pasture their goats and sheep, and only cultivate sufficient barley and wheat for their present wants. The Armenians are most industrious cultivators of the soil, and collect in large villages in the valleys. In Bulanuk some Kurdish villages that I passed through were half underground and were the merest hovels. Sledges were used also to bring home the harvest, although it was summer-time and the ground was almost level and fit for carts. Sledges drawn by two bullocks are used also to a certain extent in the Kawash and Karchikan districts on the south shore of the lake during the summer, but there the slopes are steeper and more difficult. All round the shores of Lake Van the soil is fertile, the supply of fresh water very abundant, and fruit gardens and vineyards abound. Van, Aganz, Akhlat, Vostan, and Adeljivas are all famous for their gardens, which produce apples, pears, plums, cherries, apricots and walnuts.

A very curious feature noticed near the Armenian villages of Chevirme and Heramik in the Khanus Su Valley were the ancient cemeteries close to them. In these, over each tomb, were a number of stone blocks carved roughly to represent a horse ready saddled and bridled. The largest reached to about half the natural size of a horse, and were of various sizes down to about 2 feet high.

From Van I followed the south shore of the lake to Bitlis. The waters contain carbonate of potash, which is dried out in pans near the town and collected in cakes about an inch thick for use as a substitute for soap.

Wheat harvests in the Van province are as a rule very prolific, and grain sometimes rots for want of storage room or means of transport to a profitable market. This province suffers perhaps more than any other in this region from want of efficient means of communication with the coast and the outer world. The neighbouring rich province of Azerbaijan in Persia has scarcely any outlet either for its produce except by long and tedious caravan routes.

The Lake of Van, as is well known, has no outlet, and it is difficult to discover any traces of one. At the small bay of Ziwa on the south shore there is a single ridge, which rises steeply 600 feet out of the lake, separating its waters from one of the tributaries of the Bohtan River, which joins the Tigris. In the Güzel Dere, farther west, the watershed

is slight, and also at the head of the Bitlis Valley, but with these exceptions the wall of rocky ranges along the south shore seems to be complete. The most acceptable theory as regards the formation of the lake is that at one time the Mush plain extended eastward as far as Van, but that an overflow of lava from Nimrud volcano blocked up the valley to the south of the mountain, and so the lake came into existence.

Leaving the lake shore at Shamunis, I turned down a by-path to Bitlis across the hills following the Guzel Dere, which runs generally parallel to the Bitlis River. South of Shamunis the track crossed a ridge rising only 150 feet above the lake level, and entered a wooded valley with a fine mountain torrent fed by numerous streams from the high ranges on either hand. At 6 miles from the lake we left the stream, which made a sweep round to the westward and flowed into the lake near Ortap, and passed through Khotum, a small village only 100 feet above the lake. South of this we crossed a very slight watershed, and passed a spring which was the source of the Keser Su, a stream going south to the Bohtan Su, so that in this direction the watershed between the lake and the Tigris basin is slight. The number of streams in these mountain valleys is very great, and this spring alone formed a stream 50 yards wide and 18 inches deep of clear water coming out of the base of a small cliff.

These mountain valleys are well wooded with low oaks and junipers for the most part, but walnut, ash, elm, and poplar are found by the stream banks. The hill-slopes on the south shore of the lake are almost entirely denuded of trees for firewood for Van, and even the roots are dug up out of the ground for this purpose. Coal is known to exist a short distance to the eastward of Van, but is not worked at all, although its use would be of the greatest service to the saving of the forests and progress of agriculture.

From Bitlis I went south to Sairt and Jezire, descending quickly through a rough wooded country from the level of the Armenian highlands to that of the Tigris basin. The road follows the narrow rocky valley of the Bitlis Su, winding through a forest of low oaks with a thick undergrowth. On either side rise abruptly steep limestone hills, wooded except along the summits. Four miles south of the town are some valuable mineral springs by the roadside which produce water very similar to that of Vichy. A mile farther on is a calcareous deposit 60 yards long and 30 feet high formed by the deposit from another mineral spring on the hillside. This entirely blocks the space between the steep slope on one side and the cliff forming the river-bank on the other, and the road passes through by a short tunnel or archway 15 feet high and 12 feet broad, said to have been cut by Semiramis. As the descent to the plain is accomplished, the country can be divided into zones varying in climate and productiveness as the altitude gets less. There is first the plain country of the Tigris basin, especially on

the left bank, extending to Mosul and the Great Zab River, which grows fine wheat crops and, where irrigated, maize, millet, cotton, and hemp. The next zone is from 2000 to 4500 feet, and is perhaps the most fertile. It is formed of the lower outliers from the main ranges and is cut up by numerous valleys and streams, and the hillsides are covered with oaks principally of the gall-bearing and valonia kinds.

The many small streams are utilised to grow rice on the hill-slopes; there are numbers of vineyards and fruit-orchards, and tobacco, maize, and corn crops are very productive. The highest zone is the summits of the mountains, which are quite bare of trees, and the general level of those in the district, south of Lake Van, is from 9000 to 10,000 feet above sea-level. These summits form, in many instances, great rolling downs, like the Pamirs on a small scale, from which the snow never entirely disappears. They constitute the grazing-grounds, in summer, for numerous nomad Kurd tribes. In July 1888 I spent a fortnight among the nomads of the Hartoshi Kurds in their "yaila" or summer quarters east of Jezire. The black tents were dotted along the banks of one of the many streams that came from the melting snows. The soil was a rich loam, probably of volcanic origin, and directly the snowdrifts disappeared the ground was covered with a carpet of short grass, thickly studded with flowers of great variety and brilliancy. Among others I noticed an Alpine gentian with a deep-blue flower, a small blue hyacinth, several kinds of iris and polyanthus, which were very plentiful. The difference of climate between here and the Tigris Valley was very marked. On June 27th, on the river-bank near Jezire, the temperature rose to 106° towards mid-day, while on July 4th, at an elevation of 7900 feet, the ground in the early morning was covered with hoar-frost, and the thermometer marked 30°. The dress of the Hartoshi Kurds in this region is a very distinctive one, and suitable to these sudden changes of temperature. The handsomest portion consists of the short jacket or pelisse, embroidered with gold lace down the front, and worn open, with the back covered with long black goats' hair of a very fine texture. A white conical felt cap is worn with a turban of black and red cotton wound round it. The sleeves of the shirt are open, and hang down almost on the ground when walking. There is an inner waistcoat and a jacket with open hanging sleeves worn under the pelisse, usually made of bright coloured silk. Wide trousers are worn, tucked into a pair of high boots of red or yellow leather, which reach half way up the leg. Most of the cloth is made from goats' hair, and is very strong and durable. A species of wild silk called "gez" is found in the hills near Jezire, and is a good deal used by the Kurds also.

Jezire is an important centre for the Kurdish tribes, both settled and nomad, who inhabit the mountain districts to the north and east. The nomads are obliged to cross at the boat bridge here in their annual

migrations in search of pasture, and the sheep-tax is levied as they cross. They dispose of wool and goats' hair on the way through, and these, with oak galls from the neighbouring forests, form the principal exports. Sheep are exported in large quantities also, and are driven westward along the caravan route to Aleppo, Damascus, and Beyrut. The mountain districts of the Bohtan and Hakkiari to the north-east and east of Jezire form a wooded region of great fertility; but the population is at present insufficient, and much of the country lies idle and almost depopulated.

From Jezire I turned aside to Shakh, a small village some 8 miles to the east, where I was told there were extensive ruins and inscriptions. After 6 miles, we crossed a large mountain stream called the Nurdush, and began a steep ascent to the village, the track winding up over a succession of small terraces irrigated by canals. The walnut and mulberry trees here were particularly fine, and the pathway in places was choked with trailing vines and briar roses. Almond, fig, olive, and pomegranate trees also appeared, and on the terraces were grown patches of Indian corn, wheat, melons, and hemp. A little cotton was seen on the higher slopes. Few scenes could be prettier than this winding ascent through large leafy trees, hedgerows of roses, myrtle and pomegranate, with vines twining overhead.

It was soon evident that we were approaching the site of some important city, as for some 2 miles to the east, along the summit of a spur, were scattered extensive remains of masonry walls, with towers at intervals. The Kurds have many traditions about this place, and the guide said that seven distinct walls could be traced which used to encircle the town. At the top of the ascent we entered the village of Shakh through a gateway in a strong masonry wall, which evidently formed part of the line of fortifications on this side. The modern village is built on the edge of a cliff projecting over the Nurdush stream 300 feet below. On the opposite bank rises a bare rocky wall of grey limestone. Running north is a side valley lined with cliffs, down which comes a large stream. I ascended this for nearly a mile and a half, and found a number of chambers cut in the side of the cliff, which had apparently been used for dwellings. One of these measured 20 feet long, 15 feet broad, and 10 feet high, with a door and window, all cut in the hard limestone, and still in excellent preservation. Near the head of the valley was the remains of a strong masonry wall which used to defend this defile.

Higher up the cliff to the east was a large arched opening leading into a chamber 60 feet long, 30 feet broad, and 30 feet high. This the Kurds called the council-chamber. Up the main valley of the Nurdush, 2 miles distant, were a number of other rock-cut chambers, some 6 feet long and 4 feet high, evidently used as tombs. The stream valley above Shakh is lined by cliffs rising, in a series of pinnacles, 1000 feet

above the stream, and crowning these on either hand were the remains of two forts, the Kala Baginuk and the Kala Kelhuk, which were built to defend the passage. Along the base of the cliff, on the right bank, could be traced the line of an aqueduct 3 feet wide and 2 feet deep, cut in the rock for nearly 1½ miles, now broken in several places, but which was used to lead the water round the end of the rocky spur on that side. In former times this must have been a place of considerable importance, and I think it may be taken as the site of the Roman city of Bezabde, the capital of the Zabdicene province. This has never been definitely fixed; but hitherto it has been supposed to be in the neighbourhood of Fenduk, higher up the Tigris. Rock-cut dwellings exist in the neighbourhood at Hassan Kaif, in the Bohtan Su Valley near Sairt, and the Tigris Valley near Fenduk, but none of these are as numerous or as well constructed as those here.

On leaving Jezire, I descended the Tigris on a raft made of a light framework of timber and reeds, made buoyant by a number of inflated sheepskins fastened in rows underneath. A raft of eighty skins gave sufficient room to pitch my tent and for the men to work the two long oars. Progress was very slow, as the speed of the current was usually depended on, and at this season, in September, it was very slight. The oars were used principally for steering.

Rafts of one hundred and fifty to two hundred skins are used by traders to carry wool and wheat down the river from Jezire to Mosul and Baghdad. On arrival at Baghdad the rafts are broken up and the wood sold, while the raftsmen return by road, carrying the skins on mules. This is a very primitive method of carrying goods, and the sculptures at Nineveh show that it was in use when that city was at its prime.

South-east from Jezire, along the foot of the hills, is a fine plain, and this depression extends up the Khabur valley as far as Amadia. Southward of this, following the course of the Great Zab until it joins the Tigris, comprises one of the most productive districts of Central Kurdistan. Near Amadia this is known as the Bahdinan District, and crossing it are a series of steep limestone ridges, which rise to about 4000 feet, and enclose well-watered valleys of great fertility, wooded with oak, elm, pistachio, juniper, and other trees. This belt of hills continues into Southern Kurdistan to the districts round Suleimania, where the ridges run nearly parallel in a north-west and south-east direction, and where the valleys are equally fertile and well watered. On the south-west edge of these ridges lies a belt of undulating gravelly hills between the Diala and the Great Zab. The limestone disappears and sandstone overlying conglomerate formations takes its place. Numerous strata of gypsum are met with, particularly round Mosul and extending south-east to Kifri, and also along the western edge of the Pusht-i-Kuh mountains farther south. At various points in this zone are petroleum and bitumen

wells, the principal being at Hammam Ali, a short way south of Mosul, where the bitumen oozes out of the calcareous rock in long threads, at Erbil, Kirkuk, Duz Khurmatli, Kifri, Mendali, and at various other points along the Pusht-i-Kuh to near Shuster in Persia. These will be seen to follow a well-defined belt running south-east from Mosul, and no doubt, if properly exploited, would yield valuable results. Also on the left bank of the Tigris, at the El Fatha defile, a short way below the junction of the Lesser Zab, are bitumen deposits which extend for some 5 miles along the bank. The strata of whitish calcareous rock run nearly horizontal on the bank, which is here from 10 to 12 feet high, and from between the strata the bitumen oozes out in considerable quantities, said to be greater in summer than in winter. It floats down the stream and pollutes it for a good way down.

Through Southern Kurdistan a description of part of my journey will show the nature of the country and the mode of travelling in it. Starting north from Baghdad on May 1st, I reached the small town of Kasr-i-Shirin, just over the Persian border on the high road to Kermanshah. My party was small, and consisted of my dragoman and myself, with a couple of muleteers, and four mules for baggage and tent. It was found better to engage the muleteers from one large town to another and not for the whole journey, as they knew the roads better.

From Kasr-i-Shirin I turned aside in a north-westerly direction, and, after crossing a country of undulating gravelly hills producing good wheat crops, at 12 miles crossed the line of round masonry towers which mark the frontier of Turkey. The small party in these towers was constantly on the alert, and sometimes had to retire into their fortress and stand a siege against a band of Kurdish raiders; 12 miles further we reached the edge of the Diala River, then in high flood, and had to halt to improvise some method of crossing. The flat river valley contained some rich alluvial soil, watered by several canals, and grew wheat and rice. Several tumuli were visible, and in one village houses were being constructed from bricks dug up from one of these. These old bricks, when obtainable, are far preferable to the sun-dried ones of the present day. Each mill had its watch-tower to protect the corn in it from raiding parties. After some time a man was found who undertook to ferry us across the river, and with a dozen sheepskins and some reeds set to work to make a raft. In about an hour's time it was ready, and was nearly 7 feet square.

It took the party and baggage over in three trips, but the current was rapid, and the raft was carried down stream a long way at each crossing, which made the work very tedious. It was pushed along and steered by a man swimming behind. The river flowed over a wide stretch of shingle in several channels, some of which we forded, and the main one remained, about 300 yards wide. Two attempts had to be made before the horses and mules would face the stream; but eventually they were

induced to follow a muleteer who swam beside the horse who acted as leader of the caravan, and guided him across. One mule less experienced than the others was swept down for nearly a mile, and was only saved by being drifted on to a shingle bank, where he got foothold and reached the shore. On the other bank we camped with some of the large nomad tribe of Jaf Kurds, whose winter grazing-ground this was, but most of whom had already left for their summer pastures on the Kuh-i-Chahil-Chashma, on the Persian frontier. From the river the track lay over a bare undulating country, mostly a gravelly soil, but crossed by numerous low ridges, and sandstone and gypsum formations.

After a march of nearly 20 miles I reached Kifri on the Baghdad and Mosul road, and from here I turned north-east towards Suleimania, the capital of Southern Kurdistan. I had some difficulty in procuring guides, as the road was said to be closed by raiding parties of the Hamawand Kurds, a tribe who possess a number of well-mounted horsemen. These move rapidly from one point to another on the great trade routes, swoop down on caravans, and disappear as soon as a superior force is brought against them. After much argument I obtained two zaptiehs, men of the local gendarmerie, to act as guides, and left on the morning of May 11th. For the first few miles the road led over some sharp ridges of sandstone, with strata of gypsum and conglomerate. An excellent cement for building is obtained from the gypsum, and houses in Kifri and Mosul are largely built from it.

The country soon opened out into an undulating plain, crossed by a great number of small gravelly ravines, with low ridges of sandstone appearing at intervals. Round Kifri is a fine wheat-growing district, and water is to be found in the streams all the year round. Just now the rivers were partially in flood, and were difficult to cross. The country was almost deserted, and we passed only two small villages during the day. In these the inhabitants turned out immediately on our approach, carrying any weapons they possessed, as they thought horsemen coming down the road must be a party of Hamawands, such a thing as a peaceful traveller being unknown. Also in a bush by the roadside I noticed a leg sticking out, and found it belonged to a small boy who had crept in there, imagining he had securely hidden himself from the dreaded Hamawands, whom he thought were approaching. Late in the afternoon the Ak Su was reached, flowing in a narrow valley bordered by gravelly hills. The zaptiehs knew nothing of the way, and the water was in flood and very muddy, so that the ford was obliterated. I tried to lead the way over where I imagined I could trace the ford, but my horse was rolled over by the force of the stream, and I swam to the opposite bank. The ford was discovered at length a short way down, and, after a march of 35 miles, we halted with some nomads of the Jaf Kurds we found by a stream bank. There was

still an abundance of grass to be found on the plain, and they were pasturing their flocks here.

Starting at daybreak the next day, I found the zaptiehs had disappeared in the night, and it was only after some difficulty I induced one of the nomad Kurds to show me the way on to Suleimania. This day comprised another long march over a grassy country similar to the last without meeting with a single soul or seeing a house. Towards evening the guide led us towards a small village called Gcuk Tepe, which lay behind some rising ground. I was riding with my dragoman some distance ahead of my baggage, and on reaching the top of the hill the village became visible a short way off at the other side of a ravine. Here again we were taken for Hamawand raiders, and the villagers turned out with great promptitude and opened fire.

Matters were beginning to look serious, as these villagers were armed with Martini-Peabody rifles, when some minutes later the mules arrived on the scene, and they realised then that we must be travellers, and ceased fire. We camped there for the night, it being the only village for miles, the headman explaining his conduct by saying the usual method of attack by the Hamawands was to advance at a gallop and rush the place, so that unless fire was opened at once there was no chance of driving them off! Next morning, a short distance after leaving the village, we crossed the Karadagh, the first outlier of the ranges of Southern Kurdistan, and entered a pretty wooded country, with a number of small streams. The sandstone and conglomerate formation was now left, and a series of parallel ridges of hard limestone with strata in some instances perfectly vertical, intervened. A few small Kurdish villages were met with, scarcely distinguishable from the surrounding country in consequence of the thick grass which grew on the flat roofs of the houses.

We made a short march of 12 miles, and halted at the village of Temar, which was hidden away in a small side valley by a stream. The soil was very rich, and the slopes round this little village were dotted with vineyards and fruit-orchards, growing pears, apples, peaches, apricots, and plums. There were a number of mulberry-trees also, and a good deal of coarse silk is produced, but not in the quantities that might be expected if proper methods of sericulture were pursued. The forest trees were species of oaks (*Quercus valonia* and *Q. infectoria*), which produced galls much used for dyeing, and also the pistachio, from the berries of which a kind of soap is made. Walnut trees are very plentiful in the frontier ranges between Suleimania and Sinna; wheat, rice, and tobacco were also cultivated in small patches round the village, the rule being to grow only sufficient to supply the bare necessities of the place, as the market of Suleimania is very small, and to reach Baghdad is a long and difficult journey for caravans. Leaving Temar and crossing another steep limestone ridge we descended into the Shehrizur Plain,

and reached Suleimania on the other bank of the Khanjiru stream. This plain extends south-east nearly to the Diala River, a distance of some 30 miles. It is well watered, and naturally extremely fertile, while at various points can be noticed tumuli, the sites of villages in ancient times; but now the population is very small in comparison to the productiveness of the soil, and only a very few Kurdish villages are to be seen down its length. The population of Suleimania is almost exclusively Kurdish, and it is a typical town of this part of Kurdistan. There are about two thousand five hundred houses, nearly all single-storeyed huts with flat roofs, with few buildings of any size. The narrow winding streets of the bazaar, with the stalls on either hand, were shaded from the sun by an arrangement of branches and leaves stretched across overhead. The articles displayed for sale reflected the tastes of these warlike Kurdish mountaineers, always fond of something bright and showy in their accoutrements and a good weapon by their side. The principal manufacture is saddles and horse furniture, shoes and leather work generally, the leather being cleverly dyed in various brilliant colours. A curious assortment of flint-locks and guns, swords, knives and daggers of all shapes, round shields of bullock hide, belts with a row of pouches for powder and bullets, and felt saddlecloths embroidered with coloured worsteds, made a very interesting display. A fair quantity of Manchester piece goods, cotton kerchiefs, etc., could be seen; but to a Kurd a Martini rifle or a good horse, looted from some Arab on the plain, are of more value than very many yards of cloth. Of eatables there was the universal Kurdish drink of curdled milk called "yaurt" cheese, raisins and several kinds of dried fruits, chiefly plums and apricots. The Jewish quarter of about one hundred houses lies outside the town a short distance off to the south.

From Suleimania I returned to Baghdad, which is the highest point to which British river steamers navigate the Tigris, and so was enabled to return home. Travelling in this country is almost entirely done on horseback; in fact, there is no other way of getting over these rough mountain roads. The pack-mules are very fine, and will go along almost any track, and the baggage is entirely entrusted to them. A small tent is a necessity, as sometimes in the mountains villages are not met with for days, and the varying climate at the different altitudes is trying to Europeans.

Before the reading of the paper, General STRACHEY, Vice-President, who occupied the Chair, said: Before proceeding with the regular business of the evening I would call attention to the very long list of gentlemen who are seeking election to the Society, which I think should satisfy you all that the reputation of the Society and the desire to join it are not any less than they have been for many years past, I might rather say they have increased. I will now ask Captain Maunsell to read his paper. I may just briefly mention to you that it is the account of the portion of a journey along the north-west frontier of

Persia, where that country joins on to Turkey, a region of which comparatively little is known, and I do not doubt that you will find Captain Maunsell's account of it is of considerable interest.

After the reading of the paper the following discussion ensued:—

Sir Henry Howorth: I feel rather embarrassed in being called upon to speak about a paper of which I have no geographical knowledge, and on which the only things I have to say are on the side of history and ethnography, of which there is of course much to be said. I may remind you with regard to that wonderful martial figure on horseback shown on the screen, that the most famous Kurd that ever lived, and the only one who made himself an historical position, was Saladin, the opponent of our great Richard I. One of the interesting features of the ethnography of this country is its extraordinarily persistent character. If you detach from the map a few names which are purely Turkish you detach from it also nearly all traces of more recent populations. Going back to those very early times when the Assyrian kings made their famous expeditions into this area they undoubtedly fought against the ancestors of the Kurds. With regard to their language, like some other races under pressure from a foreign yoke, they have changed it, but they have retained their nationality, appearance and other characters. Before they began to speak a dialect of the Iranian language, the Kurds no doubt were the aborigines of this country, whose language is represented by the inscriptions at Van, deciphered by Professor Sayce. One of the interesting things in an area like this is to find that not only the race is persistent but has persisted almost exactly in its primitive form —I am speaking of the Kurds, and excepting in the north the Armenian race, whose advent also we can completely date. Now if we detach this Armenian race we have from Tiflis right down to the spurs of the mountains out of which the affluents of the Tigris rise one continuous race, to which Herodotus gave the name of Allophyllian; the southern part of it has adopted another language as I have said, but in the north it retains its old language the Georgian, but in other respects, in the whole of this area from Tiflis to the plains inhabited by the Arabs, they form one continuous people. The misfortune of mountain peoples separated into small valleys is that they have no annals, and the history of the Kurds has been the history of mountaineers, harassed, destroyed, trampled upon by every invading horde that has passed over this district. No more terrible page in all history is there than the story of the Mongol conquest of this district and the adjacent district of Luristan. Nowhere was there so much bloodshed, and nowhere was there an area so completely depopulated. The Seljuks, when they came into this area, performed the same part. It is a curious thing that in Kurdish history the only prominent figure is the famous martial chief against whom the early crusaders fought. We can carry back the history of this country to a very early date. The very earliest accounts we have of the Assyrian campaigns north of the Tigris show that the whole of these mountains was occupied by one people divided into a great number of small tribes, each with a chief living in his castle, exactly as the reader of this most graphic and excellent paper has pointed out they do still. I must be allowed in conclusion to say, if I am not impertinent, that both history and ethnography are under deep obligation to a traveller so well equipped as Captain Maunsell, whose description was so graphic, and whose paper contains so much that is interesting and valuable, and I would also submit that these ethnographical and historical sides of geography may be somewhat germane to the discussions you hear here.

Mr. Holmwood: Although I am on duty very near to the scene of the paper read to-night, I have learnt all I know in a geographical sense about Kurdistan

from what we have just heard, and really have nothing whatever geographically to say that can interest this meeting. Speaking generally, the whole of Asia Minor is more or less in the same condition as Kurdistan in regard to its development. I do not think we shall ever see the proper opening up of these immensely fertile plains, extending nearly from the west coast of Asia Minor to Armenia and Kurdistan, until not only we have a more civilised government (although Turkey has done very much recently in the way of increasing the efficiency of her government), but also until we have much larger populations. In Asiatic Turkey, where my duty lies in increasing British interests and commerce, I see what I saw in East Africa, that the great bar to developing these countries, one which never existed throughout the history of the development of India, is its very sparse population. In Africa we know the slave trade has brought the populations to their present very low ebb. In Turkey undoubtedly the wars have reduced the men to a comparatively small number, but I believe that as government increases in civilisation, and, above all, as the railways which now communicate with the interior whose extensions, already commenced, will reach fully half way, from Smyrna to Baghdad, we shall have these Armenians settled in the plains, where their natural taste for agriculture will induce them to populate and cultivate the country, leaving the Kurds, who are nomads, and always will remain so, with their flocks and herds in their own mountains. I have much pleasure in saying these few words in response to the request of the President, and am very sorry I can say nothing whatever geographically to interest you who know probably much more than I do about the country that has been described this evening.

Mr. Douglas Freshfield: I am very sorry that we have not more of the recent travellers in Kurdistan here to-night. I wish we could have heard Colonel Clayton, who recently contributed to the *Alpine Journal* an excellent description of the mountains round Lake Van, and the probably volcanic causes of the present condition and want of exit of that lake. I wish still more that an accident had not prevented Mrs. Bishop, one of the most recent travellers in the out-of-the-way parts of that region, from being present. As to my own knowledge of Kurdistan, the first thing I heard to interest me in the country came from a traveller whose talent touched upon genius, the late Gifford Palgrave, who described Kurdistan and the Kurds to me when I was in Constantinople in 1868. You may remember an interesting article, republished in Palgrave's 'Ulysses; or, Scenes and Studies in Many Lands,' in which he dealt with the future of the Kurds. He believed that they might supply the nucleus of a nation, which, if supported by English politicians, might be made the backbone of resistance to Russian advance in that part of Asia. I saw the Kurds principally on their northern frontier, near Erivan, and about the slopes of Ararat and the highlands just inside the Russian frontier, where the Kurds come in the spring. There is nothing more picturesque than the Kurdish women in their bright dresses. The men are said to be great robbers; but I like robbers, if they do not rob me, and, so far as I had anything to do with them, they were extremely hospitable. Their country, as seen from a high perch on Mount Ararat, is in most striking contrast to the Caucasus, which is broken up into hill and dale, like Switzerland. The excellent paper read to-night probably describes Kurdistan very well as a Little Pamir. The effect it gives you is of a country raised up nearer to heaven than most countries, high bleak tablelands separated by hills rising up in isolated blocks. Leaving it on the north, you go over a low grass pass, and suddenly descend into valleys where you may fancy yourself in the Jura among pine woods, bright running streams, and villages. I do not know that I can add anything more than these rusty and rather vague reminiscences to the paper you have heard

to-night. I am quite sure that much remains to be done in this region, particularly in the way of archæology. There must be, as along the whole of the frontier of the Eastern Roman Empire, lost cities with inscriptions to be deciphered, and older remains than Roman to be discovered.

General STRACHEY: I have to ask you to return your thanks to Captain Maunsell for his very interesting paper, and to the gentlemen who have spoken to-night.

NOTE ON CAPTAIN F. R. MAUNSELL'S MAP.—The instruments used by Captain F. R. Maunsell, R.A., were a 6-inch sextant, an artificial horizon, a half-chronometer watch, an aneroid, and prismatic compass. The following are the places at which the error and rate of the watch were determined:—Samsun, Sivas, Erzerum, Mosul, and Busra; longitudes being taken at fifty-nine different stations. As a rule only one star was observed, but in several cases both sun and star were taken. A large number of aneroid observations were recorded, from which the heights shown have been determined. In the compilation of the map, outside the routes traversed by Captain Maunsell, use has been made of the most recent and reliable material.

THE GEOGRAPHY OF MAMMALS.*

By W. L. SCLATER, M.A., F.Z.S.

No. I.—INTRODUCTORY.

IT has long been evident to naturalists that the ordinary political divisions of the Earth's surface do not correspond with those based on the geographical distribution of animal life. Europe, for instance, the most important of all the continents politically speaking, is for zoological geographers, as well as for physical, but a small fragment of Asia. Again, the strip of Africa which borders the Mediterranean and extends to the Sahara agrees closely, as regards its animal life with Europe, and is altogether different from the great mass of the African continent. Proceeding to America we find that physical geographers, as well as political, divide the two great masses of the New World at Panama. But those who study distribution have ascertained that Central America and Southern Mexico belong zoologically to South America, and they are consequently obliged to place the line of demarcation much further north.

Let us, therefore, dismiss from our minds for the moment the ordinary notions of both physical and political geography, and consider how the Earth's surface may be most naturally divided into primary regions, taking the amount of similarity and dissimilarity of animal life as our sole guide. In order to endeavour to solve this problem, let us select the mammals, as the most highly organised and altogether the

* Map, p. 168.

best-known group of the animal kingdom, and examine the geographical distribution of this class of animals over the world's surface.

Mammals are divided by naturalists into eleven large groups, called "Orders." As regards their distribution, however, these orders fall into two very different categories, according as they live on land or in the water—terrestrial and marine. For out of the eleven orders, one of the principal divisions of the carnivora—the pinnipeds or seals, and two other orders in their entirety—(the cetaceans or whales, and the sirenians or manatees) are specially adapted for existence in water. Land is, therefore, a barrier to their extension, whereas, on the contrary, in the case of the ordinary terrestrial mammals, land is the means by which they extend their ranges, and seas and rivers form their restraining boundaries.

We will for the present put aside the marine mammals, and address ourselves to the discussion of the distribution of the nine terrestrial orders, namely:—

1. Primates.
2. Chiroptera.
3. Insectivora.
4. Carnivora.
5. Rodentia.
6. Ungulata.
7. Edentata.
8. Marsupialia.
9. Monotremata.

Now, as is generally agreed by naturalists, one of the most certain and best ascertained points in the classification of mammals is, that these nine orders can be grouped primarily in three natural divisions (which may, in fact, be considered as sub-classes) of nearly equal value. These three sub-classes are, as named by Professor Huxley—the *Prototheria*, embracing only the order Monotremata—the *Metatheria*, equivalent to the order Marsupialia, and the *Eutheria*, which includes all the remaining orders from the Edentata to the Primates. Let us, therefore, consider the distribution of the members of these three sub-classes on the Earth's surface. When we come to examine the distribution of these groups on the map, we shall find that the monotremes are wholly confined to Australia and New Guinea; that the marsupials predominate in Australia, and are only met with elsewhere in South America (one or two species of opossum occurring in North America, but being probably only recent intruders from the south); and that the typical mammals or *Eutheria* occupy the rest of the world.

Again, after examining the distribution of the seven orders of typical mammals, we remark the following significant facts:—

1. The absence of insectivores in South America.

2. The great prevalence of edentates in the same country; the sloths, armadilloes, and ant-eaters constituting three out of the five known families of this order, being entirely confined to South and Central America.

Taking these main facts as our guide we may divide the land-surface of the Earth as follows, into three divisions:—

(1) Land where marsupials prevail; no *Eutheria*, except rodents and bats; monotremes.	Australia, New Guinea, and the adjacent islands.	*Notogæa.*
(2) Land where *Eutheria* and marsupials occur; no insectivores; many edentates; no monotremes.	America south of the Isthmus of Tehuantepec.	*Neogæa.*
(3) Land where *Eutheria* only occur; few edentates, no marsupials nor monotremes.	Europe, Asia, Africa, Asiatic Islands down to Wallace's line, and North America down to the Isthmus of Tehuantepec.	*Arctogæa.*

The fault of this division is that it leaves the great mass of land in the Northern Hemisphere undivided and rather unmanageable. But this northern land is easily separable into four sections, although it must be understood that these four sections are not of equivalent value to the two other primary divisions. Thus we obtain a division of the land-area of the globe for mammals into six areas, which are called Regions, and may be shortly defined and named as follows:—

NOTOGÆA.	Australia, New Guinea, and adjacent islands up to Wallace's line.	I. *Australian Region.*
NEOGÆA.	Central America, south of the Isthmus of Tehuantepec, the West Indies, and South America.	II. *Neotropical Region.*
ARCTOGÆA.	Africa, south of the Atlas, and Madagascar	III. *Ethiopian Region.*
	South Asia, Philippines, and Islands of Indian Archipelago down to Wallace's line, and Celebes.	IV. *Oriental Region.*
	North America, down to the Isthmus of Tehuantepec.	V. *Nearctic Region.*
	Europe, Africa north of the Atlas, and Northern Asia.	VI. *Palæarctic Region.*

We will now take a brief survey of the principal features of these six regions—as shown in the accompanying chart—and their most characteristic mammal-forms.

1.—Australian Region.

Extent.—Australia, New Guinea, and Moluccas up to Wallace's line, New Zealand, and the numerous islands of the Pacific.

Characteristics.—Absence of nearly all eutherian mammals, except a few rodents and bats; presence of six distinct families of marsupials with one hundred species, and the only two known forms of monotremes.

2.—Neotropical Region.

Name.—νεὸς, new, and τρόπικος, *i.e.*, tropical land of the New World.

Extent.—America, south of the Isthmus of Tehuantepec, and the West Indies.

Characteristics.—Monkeys of the families *Cebidæ* and *Hapalidæ* absence of frugivorous bats, and presence of vampires; abundance of the porcupine family; absence of insectivores and civets, also of elephants; presence of tapirs; no ruminants except deer and lamas; presence of sloths, ant-eaters, and armadilloes; opossums.

3.—Ethiopian Region.

Name.—Αἰθίοπες, ancient name for negroes.

Extent.—Africa, south of the Atlas; Arabia up to the Persian Gulf and Madagascar.

Characteristics.—Chimpanzee and other monkeys; absence of bears and deer; presence of lion, African elephant, hyrax, rhinoceros, hippopotamus, wart-hog, numerous antelopes, giraffe, manis, ant-bear—general richness in large and highly-organised ungulates.

4.—Oriental Region.

Extent.—Southern Asia, south of the Palæarctic Region, and islands of Indian Archipelago down to Wallace's line, including Celebes.

Characteristics.—Orangs, gibbons, and other peculiar monkeys, flying lemur, tiger, and other cats, Indian elephant, rhinoceros, Malayan tapir, manis.

Generally, it may be said that the peculiar forms of the Oriental Region are fewer than in the Ethiopian Region, and that the Oriental Region has bears, deer, and tapirs, which are wanting in the latter.

5.—Nearctic Region.

Name.—νεὸς, new, and ἄρκτος, *i.e.*, northern district of the New World.

Extent.—North America, down to Isthmus of Tehuantepec.

Characteristics.—General mammal-fauna, very like that of the Palæarctic Region, but mixed up with endemic forms and intruders from the south. Bears, beavers, sheep, and deer similar; prong-buck, pouched mice and musquash peculiar; racoon and opossum, probably derived from the south.

6.—Palæarctic Region.

Name.—παλαιὸς ancient, and ἄρκτος north, as embracing the whole northern area of the old world.

Extent.—Land north of a line to the south of the Atlas, and running eastward through south of Palestine and Persia, along the Himalayas, through Central Asia and the centre of China to the Pacific.

Characteristics.—Absence of monkeys, lemurs, and frugivorous bats; abundance of carnivores—ounce, lynxes, wolves, foxes, bears, weasels, glutton; rodents—marmots, beavers, pikas; ungulates—sheep, deer chamois, and musk-deer; no elephants nor hyrax.

This division of the Earth's surface into six regions was first proposed by Mr. P. L. Sclater, F.R.S., in an essay on the distribution of the class of birds read before the Linnæan Society in 1857 (9). It was further elaborated and upheld by the same author, in an address given to Section D of the British Association at the Bristol Meeting in 1875 (10), and in a Paper published in *The Ibis* in 1891 (11). Mr. Sclater's system was adopted by Mr. Wallace in his standard work on 'Geographical Distribution' (13), and was there shown to be applicable to the other principal groups of terrestrial animals. Moreover, the names then bestowed on the six great primary regions are now in general use among naturalists in all countries. Mr. Wallace, who has devoted many pages to the discussion of this subject,* has come to the conclusion that, admitting that these six regions are not precisely equal in rank, and that some of them are more isolated than the others, they are in geographical equality, compactness of area, and facility of definition beyond all comparison better than any others which have been suggested for the purpose of facilitating the study of geographical distribution.

Notwithstanding Mr. Wallace's strong support, however, Mr. Sclater's system has not been universally accepted. Professor Huxley (6) in 1868 proposed to separate the world into two divisions—Arctogæa and Notogæa, the former containing the Nearctic, Palæarctic, Ethiopian, and Oriental Regions of Mr. Sclater, and the latter the Neotropical and Australian Regions. He adopts the Sclaterian Regions Nearctic, Palæarctic, Ethiopian, and Oriental as subdivisions of Arctogæa, and only stipulates for the formation of a Circumpolar province independent of the Nearctic and Palæarctic Regions. Notogæa Professor Huxley divides into three provinces (1) the Austro-Columbian (=the Neotropical), (2) the Australian (= the Australian Region minus New Zealand), and (3) the New Zealand province.

From this it will be seen that Professor Huxley's scheme does not diverge materially from the Sclaterian system; the chief points of differ-

* 'Geographical Distribution of Animals,' vol. i., chap. iv.

ence being (1) the uniting together of the Australian and Neotropical Regions into Notogæa; (2) the formation of independent Circumpolar and New Zealand provinces. With regard to the first point, almost the only bond of union between the Australian and Neotropical Regions, so far as mammals, at any rate, are concerned, is the presence of Marsupials in both regions. But the Marsupials of Australia seem to have but a very remote connection with those of South America, and there is at present no palæontological evidence of the former occurrence of the Australian forms, or of forms allied to them, outside of Australia itself.* On the other hand the presence of fossil opossums (*Didelphyidæ*) in the Eocene beds of France, shows that the South American forms were formerly more widely spread.

Professor Huxley also cites the Parrots (*Psittacomorphæ*) "as helping, together with the three-toed *Ratitæ*, to bind together the widely-separated portions of the south world." But on referring to the account of the distribution of the Parrots in Salvadori's recently published catalogue (8), it will be found that out of the six families into which he divides the group, five are practically confined to the Australian Region, and that the remaining one is widely spread throughout the tropical regions of both hemispheres. The most recent arrangement of this family, therefore, gives little support to Professor Huxley's arguments.

Looking, again, to the distribution of the *Ratitæ* (wingless birds), we find the Neotropical form (the rhea) more closely connected with the ostrich, the Ethiopian form, and that they both differ considerably from the emus, cassowaries, and kiwis, the three Australian representatives of this order. Thus, then, there seems to be scarcely any ground for connecting the Neotropical and Australian Regions under the name "Notogæa."

Before discussing the other differences between the Sclaterian and Huxleyan schemes, it will be as well to mention the diverging views of some other naturalists. Of these the chief is Prof. Heilprin, of Philadelphia, who in his 'Geographical and Geological Distribution of Animals,' "in accordance with a suggestion by Prof. Newton," has proposed to unite the Nearctic and Palæarctic Regions into a single realm—the "Holarctic"—and to separate the Pacific Islands from Australia as the "Polynesian Realm." Again, Mr. J. A. Allen, of New York, in his recently published Papers (1 and 2), has shown considerable independence of thought in this matter. In the introduction to the later of the two Papers quoted, which deals chiefly with the distribution of North American mammals, Mr. Allen gives an account of

* Recently Señor Ameghino has described from the Santa Cruz beds of Patagonia, which are probably of Eocene age, certain fossil mammals which he has referred to the Daryun Dal, one of the Australian families. If these relationships should turn out to be correct, it will indicate further evidence of some connection between South America and Australia, though at a considerably remote epoch of geological time.

the influences which, in his opinion, mainly determine the geographical distribution of life, dwelling first on the great importance of temperature and moisture, and afterwards on the inter-relation of land-areas, which, he says, is "co-eval and perhaps more than co-ordinate with climate in its influence upon the distribution of life." Next, Mr. Allen treats of the seven primary life regions, or "realms" as he terms them, into which he proposes to divide the Earth. These are:—

1. *An Arctic Realm*, occupying all the country in both hemispheres north of the isotherm 32° F., this boundary corresponding very closely to that of the northern limit of trees.

2. *A North Temperate Realm*, occupying the whole of the northern hemisphere between the isotherms of 32° and 70° F.

3. *An American Tropical Realm*, consisting of Tropical America.

4. *An Indo-African Realm*, consisting of Africa, except the northern border, and Tropical Asia and its islands.

5. *A South-American Temperate Realm*, embracing extra-tropical South America.

6. *An Australian Realm*, equivalent to the Australian Region of Sclater.

7. *A Lemurian Realm*, containing Madagascar and its islands.

Mr. Allen's views on Distribution have been criticised and answered by another American naturalist, Mr. Gill (4), who proposes a division of the Earth into nine "realms." These, as will be seen, although not differing in many cases from regions adopted by former authorities, are distinguished by an entirely new set of names, as follows:—

(1) The Anglo-gæan (= Nearctic Region).

(2) The Eury-gæan (= Palæarctic Region).

(3) The Indo-gæan (= Oriental Region).

(4) The Afro-gæan (= Ethiopian Region).

(5) The Dendro-gæan (= the tropical half of the Neotropical Region).

(6) The Amphi-gæan (= the temperate half of the Neotropical Region).

(7) The Austro-gæan (= Australia, New Guinea, and the adjacent islands).

(8) The Ornitho-gæan (= New Zealand).

(9) The Neso-gæan (= Polynesia).

Dr. Bowdler Sharpe (12) has also recently published his views on the zoo-geographical areas, as worked out from the distribution of birds. Dealing here only with the division of the Earth into regions, we notice that, although he makes many complimentary allusions to Mr. Allen and his views, he adopts in all its entirety the Sclaterian system, with the exception that he constitutes an Arctic sub-region to include the more northerly parts of both the old and new worlds.

Finally Professor Newton, who has recently published his views on

this subject as regards birds (7), adopts the methods of divisions proposed by Mr. Sclater with the two following exceptions. In conformity with the suggestion already made to Professor Heilprin, he unites the Palæarctic and Nearctic Regions under the title "Holarctic," and he also separates New Zealand from Australia as an independent region.

The chief questions in dispute, therefore, seem to be as follows:—

(1) Whether the Palæarctic and Nearctic Regions are to be recognised as separate?

(2) Whether Madagascar and New Zealand are to be separated as independent regions from the Ethiopian and Australian Regions respectively?

(3) Whether the Ethiopian and Oriental Regions should be joined to form one region?

(4) Whether there are any good grounds for dividing the Neotropical into two separate regions.

The only way in which questions of this sort can be definitely settled is by constructing lists of the families and genera of the various classes of the terrestrial faunas of the regions in dispute, and then carefully comparing them, in order to determine the percentage of peculiar species and of absentees. The difficulty of doing this satisfactorily is twofold.

(1) The absence of any definite boundaries to most of the regions, and hence the difficulty in determining how many of the border-forms, which have obviously intruded from the neighbouring regions, should be counted.

(2) The uncertainty as to the limits of the genera. This uncertainty has been greatly increased of late years by the action of some zoologists in proposing a multitude of unnecessary generic terms.

When these two factors have been settled and the lists constructed, a further difficulty is met with, and this is one which depends very much on the individual fancy of the author, namely, as to the percentage of peculiarity which should be required to constitute a region.

Taking the first question in dispute, we find that Mr. Allen, in his paper already quoted (2), gives a tabulated list of the genera of his North Temperate realm, dividing them into North American and Eur-Asiatic (= Palæarctic) forms, and putting the individual genera into three categories, namely, those circum-polar, or common to the Nearctic and Palæarctic Regions (numbering 32); those peculiar to each region (*i.e.* 29 to Nearctic and 41 to the Palæarctic); and, finally, those which range further south into the Neotropical Region on the one hand, and into the Oriental and Ethiopian Regions on the other.

Working from these tables we find that 38 per cent of the Nearctic genera and 42 per cent. of the Palæarctic genera, are confined to their respective regions, while 42 per cent. in the case of the Nearctic and 34 per cent. in the case of the Palæarctic, are common to the two regions.

These last percentages include, however, several quite wide-spread genera which can hardly be called circum-polar—such as *Sciurus*, *Sciuropterus*, *Lepus*, *Lutra*, *Canis* and *Felis*.

These figures show that there is, as has indeed never been disputed, a great amount of similarity between the Nearctic and Palæarctic faunas, but not enough to justify the junction of these two great land-masses into one "region" or "realm."

As for the so-called "Arctic realm," which consists of the land bordering the Polar Ocean and Hudson's Bay and the great peninsula of Greenland, "beyond the limit of arboreal vegetation," together with the similar Arctic portion of the old world, Mr. Allen states, no doubt correctly, that it contains a "homogeneous hyperborean fauna of circumpolar distribution." But looking to the extreme poverty of life in these inclement latitudes, as Mr. Allen well puts it, I think it quite unnecessary to elevate this wretched fraction of the Earth's surface into one of its principal constituent life-regions. The plan adopted by Mr. Sclater and Mr. Wallace, of regarding it as a borderland between the Nearctic and Palæarctic Regions is in my opinion far preferable.

The question of the recognition of Madagascar and New Zealand as independent regions will be further discussed in the articles on the Ethiopian and Australian Regions respectively, as will also the propriety of dividing the Neotropical into two separate regions. A few words, however, may be said here with regard to Mr. Allen's proposal to join together the Oriental and Ethiopian Regions into one "Realm."

According to the estimate given below (Table I.), the total number of genera found in the Oriental Region is one hundred and thirteen, and of these thirty-nine are not found elsewhere. Of the balance—seventy-four—eight only are common to the Oriental and Ethiopian Regions, and are not found in any other region,* whereas twenty-eight more, also known to the Oriental and Ethiopian Regions, are likewise found in the Palæarctic Region. Furthermore, out of the eight genera above mentioned, although they are not now found in the Palæarctic Region, four of them are known to have existed there during the Pliocene period. This shows, I think, very conclusively that what small resemblance there is between the mammals of the Oriental and Ethiopian Regions is due to a similarity in their origin, rather than to any sort of direct connection between the two regions.

To sum up the subject I add a table of the numbers of orders, families, and genera of mammals found in the six different regions, together with the number of genera confined to them (endemic), the number of those just crossing the regional borders (quasi-endemic), and the number of those of extended distribution in each region.

* These are *Manis*, *Rhinoceros*, *Elephas*, *Golunda*, *Atherura*, *Viverra*, *Mellivora*, and *Nycteris*.

In the second table these numbers have been reduced to percentages, which give in some respects a better idea of the relative specialisation of the mammal-fauna of each region. On examining these tables it will be seen that the Ethiopian Region stands second in point of number of genera confined to it, coming next to the Neotropical Region.

The lists of genera from which this table has been worked out are based on those adopted in Flower and Lydekker's (3) standard work on mammals, with a certain number of additions and corrections. In consequence of this the figures in the case of the Nearctic Region will not be found to exactly correspond with those quoted from Mr. Allen above (2). It must, of course be understood that the figures are merely approximate.

TABLE I.—Approximate Numbers of Families, Genera, and Species of Mammals in the six Regions.

Regions.	Families.				Genera.				Species.
	Endemic.	Quasi-endemic.	Wide-spread.	Total.	Endemic.	Quasi-endemic.	Wide-spread.	Total.	Total.
1. Australian .	7	4	11	22	51	6	27	84	284
2. Neotropical	10	5	13	28	103	15	12	130	501
3. Ethiopian .	10	2	30	42	99	3	48	150	577
4. Oriental .	2	1	33	36	39	10	64	113	557
5. Nearctic .	2	0	20	22	21	2	43	66	192
6. Palæarctic .	0	0	32	32	25	4	74	103	448

TABLE II.—Numbers given in Table I. Reduced to Percentages of Total Numbers of Families and Genera.

Regions	Families.			Genera.		
	Endemic.	Quasi-endemic	Wide-Spread.	Endemic.	Quasi-endemic.	Wide-Spread.
1. Australian	31	18	50	60	7	32
2. Neotropical	35	17	46	79	11	12
3. Ethiopian	23	4	71	66	2	32
4. Oriental	5	2	91	34	8	56
5. Nearctic	9	0	90	30	3	65
6. Palæarctic	0	0	100	24	3	71

The groups entirely confined to each region are classed as "endemic;" those that merely cross the frontiers as "quasi-endemic;" all others are considered as "wide-spread."

The percentages, it will be observed, on account of the omission of fractions, do not exactly make up one hundred in every case.

List of Literature referred to.

(1) Allen, J. A.—"The Geographical Distribution of Mammals." *Bull. U.S. Geol. Surv. IV.*, p. 376 (1878).
(2) ——— "The Geographical Distribution of North American Mammals." *Bull. Amer. Mus. Nat. Hist. IV.*, p. 199 (1892).
(3) Flower, W. H., and Lydekker, R.—'An Introduction to the Study of Mammals, Living and Extinct.' London (1891).
(4) Gill, J.—"The Principles of Zoo-Geography." *Proc. Biol. Soc., Washington, II.*, p. 1 (1885).
(5) Heilprin, A.—'The Geographical and Geological Distribution of Animals.' London (1887).
(6) Huxley, T. H.—"On the Classification and Distribution of the Alectoromorphæ and Heteromorphæ." *Proc. Zool. Soc.*, 1868, p. 294.
(7) Newton, A.—Article on Geographical Distribution in the 'Dictionary of Birds,' p. 311. London (1893).
(8) Salvadori, T.—'Catalogue of the Psittaci or Parrots in the Collection of the British Museum.' London (1891).
(9) Sclater, P. L.—"On the General Geographic Distribution of the Members of the Class Aves." *Journ. Proc. Linn. Soc. (Zool.)*, vol. ii., p. 130 (1858).
(10) ——— Address to Section D (Biology). 'Report of the Forty-Fifth Meeting of the British Association at Bristol,' p. 85 (1876).
(11) ——— "On the Recent Advances in our Knowledge of the Geographical Distribution of Birds." *Ibis* (6), vol. iii., p. 514 (1891).
(12) Sharpe, R. B.—"On the Zoo-Geographical Areas of the World." *Nat. Science III.*, p. 100 (1893).
(13) Wallace, A. R.—'The Geographical Distribution of Animals.' 2 vols. London (1876).

DESCRIPTIVE NOTES ON THE SOUTHERN PLATEAU OF BOLIVIA AND THE SOURCES OF THE RIVER PELAYA.*

By CHARLES M. S. PASLEY.

The area of the southern plateau, or "Pampas Peladas," of Lipez is about 11,000 square miles. It is situated to the east of the highest range of the Andes, and of the various ranges whose eastern slopes form the headwaters of the Rivers Pilcomayo and Pelaya, and between the "Salina Grande," or Great Salt Pampa, which forms the central plateau in lat. 20° S., and the mountains of Lipez and Queteña in lat. 22° S.

In many places these pampas have the appearance of old lake-beds extending southward from Lake Aullagas, showing evidences that the Lake of Titicaca at one time extended to these regions. On the hill-sides in many places the evidences are very distinct, the rock being

* This article has been in hand for more than a year. It has been kept back in the hope that a suitable map would be received from Mr. Pasley. As no map has come to hand, it has been considered desirable to publish the article without further delay.

eaten away by the action of the water for a considerable distance, giving the appearance of a "blanket," or horizontal vein; but these marks disappear entirely in some parts, owing to the action of weather and to slides of earth from the hills. In the northern part of the plateau, in the vicinity of the Salt Pampa, there are small hills and patches of "travertin," otherwise known as calcareous rock, containing shells, etc.; this is termed by the natives "caliche," the term used on the Pacific Coast for the crude nitrates that are found in Tarapaca. This rock is used for building purposes; the blocks form substantial walls, while the Indians burn it in small kilns of their own make and extract the lime. Further south the pampa is perfectly bare and nearly level, presenting to the eye a vast stretch of brown earth, varied by patches of salt. This earth in the rainy season, between December and March, is changed to mud, and thus is impracticable for traffic; and in winter it is alternately baked and frozen.

During the heat of the day the effect of the mirage is frequently seen here, all the distant hills, and even the small hills at the distance of a mile, appearing to be in the air; and as the railroad* from Antofagasta crosses the pampa, I have seen the curious spectacle of a locomotive and train apparently flying through the air.

Further south again, where the pampa commences to rise, it is broken by low hills or undulations, and is covered with "tola," a short, hardy, resinous shrub, somewhat like the sage-brush of North America, and very valuable for fuel. "Paja brava" also grows there, a spiky grass which affords pasture for large herds of llamas.

The principal feature in these pampas is the Rio Grande de Lipez, which rises in the south, in the mountains of Nuevo Mundo, having an important tributary, which rises more to the south-west, in the hills of Suniquira. After leaving the hills in several small streams, which unite at the edge of the pampa, and flow round a small, conspicuous hill called Galeras, that river has a sandy bed, and in the winter months disappears and flows underground, in "manantiales," as they are termed. The river reappears again some 20 miles lower down as a fair-sized stream, sluggish, and well stocked with ducks and other water-fowl. Its water is very salt and quite undrinkable, but I found the ice formed from it in June was when melted good enough for cooking purposes and for watering the animals. The river as it approaches the salt pampa divides into several branches, and forms a small delta before finally disappearing in the salt. In the rainy season it becomes a large river, sometimes rising 7 to 8 feet, overflowing its banks, and spreading to

* This railroad from the Pacific coast, built by the Huanchaca Mining Company, has lately been extended to the town of Oruro. It has nearly 620 miles of line, with a gauge of 2 feet 6 inches, and thus is the longest narrow-gauge line in the world. It also possesses the highest bridge, the San Pedro bridge being 325 feet high.

a great distance, leaving, as it retires, numerous lagoons, which however soon disappear.

There are many other small streams that drain into these pampas and lose themselves in the sand, the principal of these being the Rivers Catani, Collpa, and Caniza. They are insignificant in the dry season, and torrents during the rains: nearly all the other watercourses are dry in the winter. In nearly all the hills that surround the pampa there are good springs of water, several being thermal, especially in the hills to the south; and in nearly all parts of the pampa, at a depth of from 4 to 6 feet below the surface, sufficient water can be obtained for drinking purposes, but near the salt pampa the water is brackish.

The ranges bordering the pampa on the west include many hills of great altitude, the highest of these being Tapaguilcha (18,960 feet), the volcano of Ollague, and that of San Pedro, nearer to the coast. All of these ranges are of an eruptive formation of recent date, the eruptive rocks being principally trachytes and andesite. I have also seen inside some of the mines diorite and porphyritic granite. There is very little slate on the western side of the pampa.

The volcano of Ollague has its principal crater on its southern side about 1000 feet below the summit; this emits a considerable volume of smoke and steam. The summit of the mountain is nearly always covered with snow; the sides of the hill are covered with masses of sulphur and iron-stained rock, and the blending of the red and yellow colours and the white cap of snow give the mountain a very beautiful appearance. It is accessible on its eastern side, but I had to abandon all ideas of making the ascent as I was unable to obtain Indians, owing to the whole week being one of religious feast days; and I was told that it was dangerous to attempt the ascent alone on account of the numerous sulphur-beds, the fumes from which overcome a man in a few moments. All the other hills in the neighbourhood are of the same appearance as Ollague, one side of the hill of Ascotan being apparently all sulphur.

Between the mountains of Ollague and Ascotan is the Lake of Ascotan, with an area of from 60 to 70 square miles. It is more of a bed of borate of soda than a lake, although numerous pools of salt water occur, and water is found at 3 feet below the crust. This crust is so firm that the old cart road to the coast passes over it, and the borate of soda varies in depth from 2 to 7 feet, and, I was informed, in some places extends to 20 feet deep. At the side of the lake was an establishment for refining and preparing the bi-borate or borax of commerce, but it was abandoned at the time of my visit, on account of the Chilian revolution and civil war. The railway passes at the western side of the lake and crosses to the north.

The volcano of San Pedro, from the crater of which a slight smoke occasionally issues, shows evidence of a very recent eruption, for the streams of lava and rock which have run over the pampa at the base of

the hill look as if they had only just stopped. I tried to find out their date from the Indians in the vicinity, but the original owners of the "ranchos" or huts had all left at the time of the war with Chili and the building of the railroad, so that no traditions remained as to the date of the eruption, as is the case in many parts of South America.

At the foot of San Pedro is a small hill, not over 150 feet above the plain, of conical shape called Puruma; this has a large crater which seems to have been the most active at the time of the eruption; there was a slight sulphurous smell over it, but no smoke.

These volcanoes and the borax lake are not shown in my map, being to the westward of the area in the map.

The mountains of Lipez at the south of the pampa are the highest group of this district, the mountain of Nuevo Mundo being 19,670 feet high, and Jacquegua about 1000 feet lower. Nuevo Mundo is shaped like a pyramid on three sides, and to the south joins on to the mountain of Jacquegua; I was told that Nuevo Mundo was inaccessible, but found that it was not so; I tried to ascend it, but as it was in the worst month of the year, July, was unsuccessful.

I started at daybreak from a small hut at the base of Jacquegua, and had no difficulty in climbing except for the very rarefied air. When the sun rose about 7 A.M., the thermometer was 9° Fahr. below zero at a height of 17,000 feet. At 2 P.M., we reached the divide that joins the Nuevo Mundo to Jacquegua; this I crossed, but in places had to go on all fours, as the tremendous wind that was blowing made it impossible to balance oneself in bad places. We were two hours crossing from one mountain to the other, owing to the wind; on a fine day I could have done this in half an hour. When we were about 400 metres (vertical) from the summit and about 1 mile of climbing, the two Indians accompanying me refused to go further, as it was late and they were nearly frozen to death. I could hardly blame them, and the prospect of passing the night at a height of 18,000 feet was not agreeable to myself; so that I had to give up the ascent, although the rest of it was easy, as I could see the rock up to the top, owing to the wind having swept the snow away and left the top completely bare. At the highest point reached, 18,430 feet, the thermometer showed 2° Fahr. at 4 P.M. In order to avoid the precipices, I had to walk about 12 miles, but I afterwards found out a much easier way, about half that distance, and in the summer, with more daylight, I could have easily accomplished the ascent. It was 9 P.M. when I reached the Indian hut on my return.

I saw nothing but "viscachas" the whole day, being above the line of vegetation, and apparently life of any description. The view from Jacquegua was beautiful; the weather being perfectly clear, I could see the "cordillera" for 300 miles to the south and for a considerable

distance to the west. The hill is of trachyte formation and has numerous veins of mineral, mostly silver, running through it.

On the northern side of Nuevo Mundo is a flat-topped hill, called the Mesa de Plata or "Silver Table," which is celebrated for its wealth of silver ores, which have been very extensively worked by the Spaniards, and more recently by a Bolivian Company which failed. The Spaniards worked on one lode, open workings from the surface to a depth of 500 feet, the lode being 50 feet wide in places. As these workings were not properly secured, the side fell in and buried a number of workmen, tradition says from 300 to 600; this accident caused the mines to be abandoned.

Further to the east is a huge broken up range called the Serrania de Guadalupe. This includes the mountains of Moroco, 18,000 feet, and Boneta, 18,380, and various others over 16,500 feet in height. The Boneta is called that name owing to the shape being more or less like the old-fashioned bonnets. All of these hills resemble Nuevo Mundo in their formation, but have slate on the eastern side. They form a large mineral district, with silver predominating, but with an abundance of antimony and copper; while lead, bismuth, gold, tin and quicksilver are also found. But there is very little work done, owing to the distance and expense of transport and the amount of water in the mines.

Ten years ago all the transport of ores and metals was performed by mules and donkeys; from this district, and as far north as Chayanta, the road was by the Argentine Republic to the port of Rosario. Now the railroad from the Pacific Coast has changed everything, opening up other mineral districts, and causing these to be abandoned. One old gentleman who had left off mining, after losing £30,000 in his mines, took me to see his machinery, which was lying in a shed at his mine. He had two vertical Tangye boilers, and three Cameron pumps. He showed me his bills of lading, from which it appeared that he had spent £7000 in freight from Rosario. I could not help thinking that his pluck ought to have had a better reward; his mine was of no account whatever.

The veins of this district run from east to west, in formations of andesite and trachyte. On the slopes of these hills the vegetation exists higher on the eastern than on the western side, owing to the winds, the prevailing direction of which is from west and south-west. Thus on the eastern side grass grows in sheltered places at a height of 16,500 feet, and the tola shrub a little lower, while on the western side the limit is about 1000 feet lower. The line of snow, or perpetual congelation, may be said not to exist, as I have seen the summit of Nuevo Mundo completely bare of snow, and as all other hills were bare at the same time, I do not think it was owing to the wind. As a general rule the snow remains on Nuevo Mundo all the year round above the height of

18,800 feet; on the Boneta and Chorolque and Jacquegua above 18,000 feet, or merely on their summits. On the hills of the western cordillera it seemed to be about 17,000 feet, and this is the height fixed by Pentland for the north of Bolivia.

Between the Nuevo Mundo and the hill of Mesa de Plata is the village of San Antonio, now nearly abandoned, only five families living there. It owed its existence to the mines, and at one time had about one thousand inhabitants. It boasts a large church and two or three fine houses, built by the Spaniards in the year 1645. It is 15,600 feet above sea-level, and is therefore one of the highest villages in the Andes.

On the plains, at the foot-hills of Boneta, is the town of San Pablo, the capital of the province of Sud-Lipez, and the residence of the provincial authorities. On my arrival the sub-prefect gave me a most cordial welcome, and apologised for not being able to invite me to his house, as the roof had fallen in, and he was taking refuge in his kitchen. The town consists of one street, very irregular, with a few alleys running off to isolated houses. There are about two hundred houses: but the population of the town is only one hundred and fifty, as most of the houses belong to the Indians, who live outside the town, and only come in for the religious feasts, or for the priest's visits to the church, which occurs two or three times a year. An enterprising Portuguese, who, I am afraid, had more capital than brains, thinking that this town would become a mineral centre, built a large house, with warehouses, etc., and consequently became bankrupt; but I benefited by his expenditure, as his house made very comfortable quarters during my stay.

The Indians of these districts are very hardy, and like all in Bolivia, are great walkers; their wealth invariably consists in the herds of llamas. These, when full grown, are worth £1 each, and some Indians own as many as a thousand. These animals may be said to entirely support the Indians, as their clothes, meat, sacks, means of transport, etc., are obtained directly from them. The ponchos and shawls made from the vicuña wool are often very fine, and are worth from £5 to £12 each. In the winter, from May to September, the Indians travel to the valleys, taking salt with them, which they exchange for maize and other products of the warmer regions.

On the slopes of the mountains of the above district there are many curious plants; some of these have valuable medicinal properties, which the old women understand very well; others are very poisonous, and cause a great mortality amongst the flocks of sheep and the donkeys; but the llamas seem to know and avoid them. The worst of these plants is known by the name of "viscachera"; there are two other plants of similar appearance, with apparently no difference, but they are harmless; they look like a bunch of broken wires, and are always mixed up with

other grasses. The "manzanilla" is another poisonous plant, with a leaf somewhat similar to the scented geranium, and has a dark yellow flower; this is of course very different to the manzanilla. In the summer months a great variety of small flowers spring up close to the ground, generally orange coloured; two of these seemed to be leafless, but on digging them up, the leaves appeared close under the flower.

The "keñua," a tree highly prized for fuel, grows as high as 16,000 feet in sheltered spots in the ravines, and grows abundantly between 14,000 feet and 12,000 feet. The principal fuel is the "yareta," a plant of the carrot family, as I am informed by Professor Philippi of Santiago, Chili. It grows in masses on the rocks, and looks like moss-covered boulders; some of the masses I measured contained 9 cubic yards of hard, resinous material. Another kind is much softer and less resinous, and grows on the pampas, but in small masses, seldom covering a square yard; but it is considered valueless for fuel.

In a few places where there is water for irrigation, the Indians cultivate barley in small patches; but this never ripens. The only flower that I knew was the calceolaria, which I found growing under some rocks on the sheltered side at the height of 15,000 feet.

I have made a small collection of plants of these high regions, which I have sent to Professor Philippi of the Botanical Gardens in Santiago.

The animals that live in these altitudes are mostly known, with the exception of some mice which inhabit the pampas, and I think live on the roots of plants. One of these I watched for several minutes; it was marked with brown and grey stripes running the length of the back, with whitish belly and the head dark. As I was armed only with a rifle I could not kill it, and the Indians either could not or would not trap one for me. The commonest animal is the wild guinea-pig, of which there are a great number; they are also a great nuisance, burrowing deep, and making the pampas very difficult for mules to pass. The natives call them rabbits.

On the hill-sides where it is rocky there are plenty of "viscachas," or Peruvian hares; they are capital eating and are very tame. I saw four of these domesticated and as tame as ordinary pet rabbits at home. The chinchilla is scarce, and I never saw one, as they are nocturnal. The Indians trap them, driving them out of their holes with ferrets. Another of the burrowing animals of the pampas has a peculiar cry, and is, I believe, similar to the "tuco-tuco" of the South, but the cry was much shriller. I never saw the animal, and could never find out exactly from whence the noise came. Of the larger animals the "vicuña" is the most abundant. There are also "guanaco" and a few deer of moderate size and of a grey colour.

There are large flocks of ostriches (*Struthio Rhea*) smaller than those of Patagonia. I found several of their nests, and the eggs formed

a welcome addition to our scanty larder. Out of eight nests that I found, the largest number of eggs in one nest was eleven; further south I have heard of much larger numbers, but the Indians assured me that they never found over fifteen in a nest. I do not know whether this is on account of the altitude or the cold; the thermometer being often 2° to 4° F. in the months of February and March, which is the hatching season, although I found eggs up to the end of May.

There are several kinds of ducks, also a kind of goose called by the Indians "huaillata." Flamingoes live in the small lagunas and streams. I found several kinds of teal and a few herons, though these latter appeared very distinct from the English kind. Of the smaller birds there is a great variety of the finch tribe; some of these are song-birds, one especially called the "hilguera," a blackbird about the size of a linnet, the notes somewhat resembling those of a thrush but much weaker. There are plenty of condor and other carrion birds, also a few small eagles and hawks.

To the south of the Lipez mountains rises a river, which is known by various names, as it generally bears the name of the district with the prefix of Rio Grande; but as half the rivers of Bolivia have this name it is somewhat confusing. The river flows eastward through rocky and picturesque ravines, occasionally widening out and having less velocity. In these favoured spots the land is cultivated, and is generally very fertile wherever irrigating ditches can be made. The crops are principally alfalfa, wheat and barley, and "quiñua," which resembles spinach when young. It grows to the height of 3 or 4 feet, and the seed is in masses of very dark crimson. The river contains a fair amount of water in the dry season, and in the rainy months is large and sometimes rises 12 to 18 feet in a few hours, and sweeps away trees and does considerable damage to the farms on its banks. As it flows past the village of Estarca, it is joined by the River Cucho; from this junction as far as the neighbourhood of Tupiza, where the river of that name joins it, it is called the Rio de Sinpacha, from the name of a town on the northern bank, while lower down it is called the Rio San Juan. From Estarca downwards the river-bed contains gold, and there are gold placers for leagues on the banks at both sides. Lower down the land is cultivated everywhere, maize being the principal product, and "chicha," the native drink, is the principal industry.

Above Estarca there are several gold-bearing quartz veins, but these are not worked; they are all owned by natives of the district, who are waiting until some unsuspicious "Gringo" (*i.e.* foreigner) shall come along and offer them the millions of dollars which the veins are supposed to be worth. I have seen some large nuggets taken from the river; one of these weighed over five ounces.

The town of Tupiza is the principal town of the district, and the capital of the province of Sud-Chichas, and was once of considerable

importance, being the seat of the Custom House, and the point of arrival and departure of most of the products of Southern Bolivia. Since the railroad from the Pacific Coast has been established, the current of traffic by way of the Argentine Republic has almost entirely disappeared, and now Tupiza has fallen into decay. It has about two thousand inhabitants.

Further north, on the Rio Grande de Cotagaita, is the town of Cotagaita, a small agricultural town of very little importance, but the capital of the province of Nor-Chichas. The river—which rises in the mountains of Chocaya and Chorolque, flows eastwards, and is joined by the Rio de Tumusla—is nearly as large as the other Rio Grande, which it meets in the district of Cinti, and forms the Rio Pelaya, the largest tributary of the Pilcomayo. The Rio de Cotagaita is very similar to the Rio de Sinpacha, being a gold-bearing stream, and has similar cultivated lands on its banks.

In the Quebradas and on the river-banks there are small forests of trees, principally of the acacia family, these being called "churqui." The wood is used in the mines and for making charcoal. I have noticed eight different kinds of these trees, being distinct in the appearance of their flowers and bean fruits. Another tree which is very plentiful is the molle. There are algaroba trees, but these are scarce. Fruit trees are cultivated apparently with difficulty. The variety in the cacti is very striking; from the giant species, some of which are 30 feet high, to the very smallest forms. The Indians use the wood of the larger species for doors and furniture, it being easily worked; they also gather the fruits and take them to the mining districts.

Nearly all the plants that I saw bore brilliant flowers, and in the summer months the hill-sides were literally carpeted with red and yellow flowers. In the valleys there is an endless variety of plants and birds, and I can only regret that I am not a naturalist to enjoy them as they ought to be enjoyed.

There are plenty of humming-birds, not, however, of very brilliant plumage; with a few exceptions, they are all of the larger kinds. The parrots are the liveliest birds, for their noise as well as their colours. There are several kinds of jays, and I saw a few cardinals.

The insects are rather disappointing; the greatest number and also the greatest variety are obnoxious, being principally venomous flies. Of these, the "nina-nina" is the most interesting; it is a large blue fly about the size of a hornet, with yellow wings and very long legs; it is said to be a general benefactor, killing the largest spiders and small snakes, its sting being very severe. I have heard that in some cases it has killed men, but it never attacks human beings unless meddled with. I once saw one kill a chicken when the youthful bird endeavoured to eat it; it seemed to drive its sting into the bird's brain.

Of the spiders, some of the most unpleasant members of that family have their homes in these valleys, one sort being as much as 4 inches across, the body being the size of a walnut; the Indian name for it is "apasauka."

Another disgusting insect is the vinchuca, the bite of this insect being very poisonous. I was bitten on the face and neck by one, and the irritation and the lump did not disappear for two months after; it is about an inch long, and looks somewhat like a beetle with a shield-shaped back. The beetles seem to be few and are of the most hardy kinds and dull colours. I did not see any tarantulas.

Of the butterflies I recognised nearly all as being closely allied to the English kinds, such as heaths, sulphurs, tortoiseshells, whites and blues.

The hills of these districts are all shales with occasional intrusions of andesite, these latter being mineral hills, containing veins of silver, lead or copper.

The principal feature of the provinces of Chichas is the mountain of Chorolque, a beautiful mountain not far from Cotagaita. It rises to a height of 18,600 feet, and towers above the surrounding country. I climbed to the top of it on a beautiful day, and I could see to the eastward for 200 miles; the atmosphere being very clear, I could easily distinguish the hills of Potosi, about 150 miles away. Of course, like nearly all the big hills of Bolivia, it contains mines, these being of tin and bismuth, and the chemist at the mines informed me that he had found tin, bismuth, silver, gold, copper, quicksilver, lead, zinc, iron, wolfram, antimony, and manganese in this hill.

The climate in the valleys is mild, the cold at night being moderate, but the heat sometimes intense. One is constantly changing from summer to winter when travelling in these mountainous districts, and the difference between the temperature in the sun and in the shade is very remarkable, owing, no doubt, to the rarity of the atmosphere and the absence of radiation.

The Indians who live on the haciendas are always directly under the control of the authorities residing in the small towns of the district, but the greater number live in communes, and are directly under a chief, or cacique, who is chosen for lifetime. They obey his orders only, and very rarely dispute his authority. The cacique is responsible for his tribe to the sub-prefect of the province, and all of these Indians pay a poll-tax of about fifteen shillings per head to the Government yearly, in return for which they have several privileges. No person can interfere with them or their lands, and they are exempted from military service, except in case of war. They also have to mend all the roads of their district. The largest item of the revenue is collected in this manner; the proprietors, etc., are very free from taxation, it being these latter who make the laws.

The Indians are very superstitious, and are Roman Catholics, nearly every small group of houses having a tiny chapel with an image of the Virgin or a saint inside; these are sometimes very curious, being made of mud or wood and being very rudely carved.

They are very suspicious of strangers; and on first acquaintance refuse to do anything or sell anything, always saying that they have nothing even when it is before one's eyes. I found that by treating them well and not doing the same as all the natives do, *i.e.* cheat them, they will in a few days do anything one wishes, and bring everything that they can, such as forage, etc. It is very inconvenient when one is in a hurry; but as nobody is ever in a hurry in this country, and everybody is poor but won't work because they have what is necessary, one can only be patient or swear, the latter being the most frequent recourse of the Anglo-Saxon.

The district lying north of the river of Cotagaita is of the same mountainous description, the two mountains of Tasna and Ubina being the principal features.

TWO BOOKS ON CENTRAL ASIA.

The journey described in Lord Dunmore's two volumes * was undertaken last year for purposes of sport and pleasure by the author and his friend Major Roche. They travelled from India by the ordinary route through Kashmir and Ladak, to Yarkand, and thence made a tour on the Pamirs, which was brought to a close at Kashgar, where the travellers separated, the author returning to Europe by the Russian road through Ferghana and Transcaspia, and his companion (it is inferred) by way of Gilgit, to India. The book is written in a lively and interesting way, and contains two useful maps. There are also many illustrations, some of them good, though the greater part can hardly be said to give a faithful representation of the scenes they are meant to depict.

In his preface Lord Dunmore tells us that the book "has no pretensions beyond being a faithful daily record of the wanderings of Major Roche" and himself. Still the author frequently treats of matters that are usually considered to lie within the domain of the geographer, the surveyor, and even, in some instances, of the historian. When dealing with these subjects he is not always so happy as when he adheres to his original purpose of describing the events of his tour. If the journey had been made over unknown ground and in a new country we should have welcomed with gratitude Lord Dunmore's attempts to furnish us with some preliminary knowledge of the geography of the region he had visited. But he does not appear always to distinguish between new

* 'The Pamirs.' By the Earl of Dunmore. 2 vols. London, John Murray, 1893.

geography and old, or to sufficiently appreciate the fact that a traveller untrained to geographical work, and possessing but a meagre "scientific" outfit, should be very cautious in his attempts to correct the results of the researches of the professional surveyors and more or less trained geographers in whose footsteps he is following. The consequence is that the book contains statements which cannot be accepted as accurate. Though the last visitor to the Pamir region, Lord Dunmore's descriptions should not be regarded as superseding those of former travellers.

The indications for altitude are given throughout the journey with little misgiving, apparently, as to their trustworthiness. They are based on the readings of ordinary aneroids, and cannot consequently be accepted as geodetical measurements. There is nothing in the book to show that the instruments used had even been tested for any particular ranges of altitudes, or that the results taken from them were based on corresponding observations at fixed stations. Even if these precautions had been taken, the heights deduced would have shown the altitudes much too high, as any reader of Mr. Whymper's work on that imperfect machine, the aneroid, would be aware; but from all the author tells us to the contrary, his altitudes are merely the readings of the aneroid scale, and have not been subjected even to local corrections. Previous travellers—Colonel Trotter, R.E., and Dr. Scully for instance—had used mercurial barometers, and had based their observations on a system (arranged for before leaving India) of corresponding observations at selected stations, whose heights had been fixed by the trigonometrical survey, and each result was properly calculated and corrected for deducing the final altitude after returning to India. Other explorers had used boiling-point thermometers, and had calculated in the same way the differences on fixed stations; work of this description, and in some cases even heights fixed directly by the trigonometrical survey, cannot be superseded by means of crude aneroid readings. These remarks apply to the whole of the route traversed by Lord Dunmore, from Kashmir to Khokand, but they do not refer to his authority for giving the heights of mountains seen only from a distance, which he could have had no means of measuring, and more especially for altering the elevation of perhaps the highest and most noteworthy mountain of the Pamirs from 25,350 feet to 25,800 feet. This peak, variously called Mustagh-ata, Tagharma,* etc., was fixed trigonometrically by Colonel Trotter, from the plains of Kashgar, in 1874; and it is difficult to conceive on what grounds Lord Dunmore adds 450 feet to the height given by Colonel Trotter on his map.

Another subject on which Lord Dunmore seeks to upset the well-reasoned conclusions arrived at by previous explorers and geographical critics, is that of the origin of the Oxus. He is of opinion that the

* It is not the Tagharma peak, however.

Aksu, or Murghábi, springing from the basin of the Chákmák Lake, or Oi Kul, is the real head-stream of the Oxus, and gives as his reasons: (1) that the course of the Aksu, from its source to Kila Wámar in Roshan, is some 10 miles longer than the Panjah from its source (close by that of the Aksu) to the junction of the two rivers at Wámar; and (2) that the name *Oxus* is derived from the Turki *Ak-su*, hence the Aksu River should be the parent of the Oxus. Neither of these reasons can be accepted as adequate. In the first place the length of course or remoteness of origin has no weight in determining the relative importance of two rivers. The chief, and usually the only, standard of comparison is that of volume, or cubic discharge for a given period of time.* This is a proposition long recognised by geographers. If Lord Dunmore could show that the Aksu, on reaching the point of confluence with the Panjah, possesses the greater volume, he might prove his theory, but this is a matter that can only be determined at the confluence itself, a locality which he had no opportunity of visiting. As far as we are informed up to the present, the facts all tend in favour of the Panjah being the larger stream. The only English explorer who has ever seen the confluence went carefully into the subject, and showed that the Aksu (there known as the Bártang) has a much less volume of water than the Panjah, while the only Russian traveller (the botanist Regel) mentions nothing about the matter. As regards Lord Dunmore's second reason, the question of the derivation of the name of *Oxus* need not be further entered into here than to point out that authorities of no less weight than Sir Henry Rawlinson and the late Sir Henry Yule have shown that it is from *Wakhsh* (the Surkháb of Karategin and Eastern Bokhara) that *Oxus* is descended, and that the similarity to the Turki *Ak-su* is a matter of chance only.†

On the subject of the lakes of the Pamirs, also, our author seems to have arrived at certain conclusions intended to modify those of previous travellers, though in one case, at any rate, he does not appear to have examined the question very closely. He tells us that the sheet of water "represented in nearly all the maps" as one large lake, and called Rang-Kul, is in reality "two distinctly separate lakes," called respectively Chor-Kul and Rang-Kul. More particular inquiries from the local Kirghiz, however, might have revealed the fact that the sheet is entirely divided only during the winter, or low-water season; while during the summer, when all the water in these regions is at a high level, the dividing spit of sand, marked in most maps as jutting out from the south shore, is submerged, and the two Kuls become one. Lord

* The extent of drainage area may sometimes become a factor, but it cannot well be applied in the case of a glacier region like the one dealt with here.

† Since these lines were written, Mr. Curzon has set forth the same view in an able letter to the *Times* of December 14th, 1893.

Dunmore was at this spot late in November when the water was low. In the same way the small lakes in the neighbourhood of the Sássik (or Sassigh) Kul probably alter their shapes, sizes, and relationship to one another according to the variation in the water-supply at different seasons, and need not therefore always be as described in the book. The author is probably right when he states that the Bulun Kul communicates with the Yashil Kul; but the map at the end of Vol. I. is distinctly faulty in regard to the small lakes above alluded to.

With respect to the tribes of Kirghiz who inhabit the Pamirs, Lord Dunmore tells us, rightly enough, that these are divided into four main tribes and many subsidiary ones, but in detailing the four chief divisions he is misleading in giving their names as "(*a*) the Naiman, (*b*) the Kipchak, (*c*) the Tai-it, (*d*) the Kissack." As far as we are aware, the list should stand :—(*a*) the Naiman, (*b*) the Tai-it, (*c*) the Kara Tai-it, and (*d*) the Kasik (not Kissack). The Kipchaks are not Kirghiz, but a tribe of entirely different origin; and though in this region they intermarry occasionally with the Kirghiz,* they can, in no sense, be regarded as Kirghiz by blood or descent. We need not enter here into particulars regarding the sub-tribes further than to remark that the Sarts are not a sub-tribe, or tribe of any kind, ethnographically speaking. The word merely indicates a townsman, or sometimes a settler, as distinguished from a nomad or grazier. A Sart may therefore be a person of almost any tribe or race common in Central Asia.

While remarking on the tribes, we should like to ask our author for some information regarding the "Chinese Tartars" whom he appears to meet with, if not on the Pamirs, at all events in Ladak, Yarkand, and other places. Who are these mysterious people never yet described by any traveller? In old books we believe that the name of "Chinese Tartar" was applied to the Mongols—the true Mongols of Mongolia—but there are no Mongols in Ladak or the districts of Yarkand and Kashgar, and indeed there is no race in any part of Asia, so far as our knowledge goes, to which such a name as "Chinese Tartar" can rightly be applied.

In matters historical Lord Dunmore is more successful than when he deals with geography and ethnography, for he has produced a fairly accurate account (Chap. 22) of the last days of the rule of the Andijanis and the subsequent (1877–78) re-occupation of Eastern Turkistan by the Chinese. The events were related to him at first hand by an eye-witness, and the story agrees mainly with the more trustworthy of the accounts which were received in India at the time. But it is tantalising to be told no more about the inscribed stone carried away by the Russians

* More especially with the Naimans, whom they regard as the direct descendants of the original Naimans of Northern Mongolia, and consequently, according to their ideas, of the most ancient Kirghiz blood.

from the banks of Yashil Kul than what is vouchsafed at p. 167 of vol. ii. It was placed in the museum at Tashkend, the author tells us; but though he furnishes a translation, he gives no hint of the date, the event it was intended to commemorate, or the language in which it is cut. It is believed that the inscription refers to the flight to Badakhshán of the Khoja rulers of Kashgar in 1759, and their pursuit by the Chinese (who had just then taken the country) up to the spot where the stone was erected. The language of the inscription has been said to be Uighur; and it was first seen by Captain Younghusband in 1890.

As might be supposed, Lord Dunmore is at his best when describing his stalks among the Ovis Poli and grey bears in the high nullahs of the Taghdumbásh Pamir. Though his visit happened to be at about the worst time of the year for finding game, he achieved a good deal, and showed himself so excellent a sportsman, that we wonder all the more when we find him make the mistake that he does at p. 191, vol. i., of believing himself to have seen a *Kastura*, or musk-deer, at Kizil-Angur near the foot of the Depsang plain, at an elevation of 16,000 feet or over. Sportsmen and naturalists may rest assured that the animal seen on that occasion was not a musk-deer, for these creatures are not to be found beyond the wooded regions of Kashmir, some 200 miles off, and are rarely seen above an altitude of about 10,000 feet. In all probability the animal met with was a female Burhel, or *Ovis Nahura*.

Dr. Lansdell, who now produces his third book,* is, like Lord Dunmore, a traveller pure and simple, and makes no pretensions to be explorer or geographer. His travels in Russian and Chinese Turkistan and in Ladak, etc., were undertaken chiefly, as he himself tells us, "to spy out the land for missionary purposes;" and it is, for the most part, to those interested in missionary enterprise that his narrative is addressed. He appears, however, to have added to this primary object a sort of hope that it might be possible for him to visit Lhasa, or, if not Lhasa, some part of Tibet easily accessible from India or China, by one of the routes already frequently attempted by others and as often proved to be impossible. By all these roads the European is expected, and they are, in consequence, carefully guarded by the officials of the Lama government. The author admits that he was many times warned by our frontier officers and others, who knew how the land lay, that his entry into Tibet by any of these gates was certainly barred; but having been provided by friends with funds to make an attempt, he thought himself bound to make one. He records with much detail the efforts he made to realise his desire by seeking the advice and help of various British officials,

* 'Chinese Central Asia. A Ride to Little Tibet.' By Henry Lansdell, D.D. Two vols. London, Sampson Low & Co., 1893.

missionaries, and former travellers. It of course formed no part of Dr. Lansdell's programme to try and penetrate Tibet from the north on his own account, as it were. Had he viewed the matter otherwise, he would have stood as good a chance as Rockhill, Bower, Bonvalot or Miss Taylor, of seeing a great part of the country and something of its people, though, it need scarcely be added, that any attempt on Lhasa would have proved as unsuccessful in his case as it was in theirs.

Dr. Lansdell's route lay eastward through the Russian possessions—by rail and post road—to the Chinese province of Ili, or Kulja; thence over the Tien-shan mountains by the Muzart pass (which he claims to be the first Englishman to cross) to Aksu, Kashgar, etc., and, after a flying visit to Khotan, along the ordinary road, by the Karakorum, to Ladak and India. Thus he saw only those parts of Chinese Turkistan which have been visited and described many times of late years by European travellers of nearly every nation, and there is therefore no occasion to trace his journey with great minuteness. After arriving in India he made some excursions to Nepal, Darjiling, Mandalay, Peking, etc., with a view to obtaining assistance to enter Tibet, and finally returned home by way of the Persian Gulf and Bagdad. His book is well and carefully got up, and bears evidence of a great deal of reading in the fields of history and geography relating to the countries he visited. The epitomised results of these studies he has embodied in several chapters which are interpolated at intervals through the two volumes, and they form, in some cases, very useful summaries. As a student, therefore, if not as a traveller, Dr. Lansdell may be said to have acquired a good knowledge of the eastern regions of Central Asia; but this being the case, it is a little surprising to find the second title of his book called 'A Ride to Little Tibet.' Little Tibet, or *Tibet i Khurd*, is a Persian name for Baltistan, a province of the Kashmir dominions lying among the mountains between Ladak and Gilgit, and was not visited by Dr. Lansdell. It appears from the context that the author has applied the name to Ladak, but that country is known to Central Asians as "Tibet" pure and simple, while the region to which the latter name is given by Europeans is usually called in Central Asia, *Chin*.

We are obliged to Dr. Lansdell for his protest (p. 318, vol. i.) against the irrelevant names frequently used in Europe to denote the province known to the Chinese as the *Sin-Chiang*, or "New Dominion"—that is, the Turki country lying east of the Pamir, and between the Tien-Shan mountains on the north, and the highlands of Tibet on the south, respectively. It is time to give up the use of such names as *Alti Shahr*, *Eastern Turkistan*, *Kashgaria*, etc., and to adopt, as the author rightly points out, that of "Chinese Turkistan," thus distinguishing it clearly from Russian Turkistan and Afghan Turkistan, besides applying to it a simple effective name, and one with a distinct meaning.

The three maps published with the book are all more or less general

ones, and are therefore suitable to the narrative, but the illustrations are not always effective or pleasing. There are some good appendices, however; more especially Appendix B on the bibliography of Chinese Central Asia, which will be found extremely useful to those interested in these regions. Indeed, printed together with the bibliographies in Dr. Lansdell's previous works, as a separate pamphlet, these lists would form a valuable guide to the literature of an important section of Asia.

THE STATE OF THE SIBERIAN SEA: THE NANSEN EXPEDITION.

By Captain JOSEPH WIGGINS.

Captain Wiggins writes from Yeniseisk, Siberia, under date December 7th, 1893:—

I daresay you are wondering how we have succeeded in our attempt to reach this part of the world once more. Suffice it to say that we found the Kara Sea much the same as usual. During the latter part of August it was well free of ice; there was no difficulty in avoiding what ice there was, and in reaching our port of destination, Golchika, in lat. 71° 40′ N., at the entrance of this magnificent river. This is my fifth visit to this place, and the ninth voyage across the Kara Sea since our first successful attempt in 1874.

The most interesting fact connected with this memorable trip is that we have succeeded in convoying the first Russian Government vessels that have ever arrived on these waters. What is perhaps of more importance to the future of this country, Siberia, we have (under private contract with the Russian Government) succeeded in landing the first section of rails for the construction of a Trans-Siberian Railway.

The Russian Government hearing of our proposed voyage with Mr. Popham in the *Blencathra* Arctic steam yacht, for the purpose of pleasure, and with the desire to assist Nansen with stores and coals across the Kara Sea, offered us the privilege of taking these first 1600 tons of rails. Though rather late in the season, we at once closed with the offer, and quickly despatched the *Orestes*, a large merchant steamer, to Vardö, where we were joined by two Government steamers and a large schooner barge, all for future use on this river. We also brought our own shallow-draught steam barge, now named the *Minusinsk*, and I am happy to say without any mishap. All these four riverine craft are now safely laid up in winter-quarters here. True, we have not managed to bring all the rails, owing to the wretched lighters that were sent down river to receive our cargo. They literally fell to pieces as we loaded them. A large portion of the rails now lies at Golchika, which must be brought up river next summer. Another

portion—some 250 tons—had to return to Archangel in the *Orestes*, seeing that no other lighters could be obtained. Nevertheless we have landed here and at Krasnoyarsk, some 300 miles further up river, about three thousand rails; and had the river barges not failed us, we should have brought up the whole cargo with ease. As it is, we have once more proved to the world at large the feasibility of this north-east ocean route. That has been accomplished not merely by specially-prepared Arctic vessels, but by ordinary sea and riverine iron steamers, one a paddle, another a screw barge, and an ordinary schooner barge, the latter being towed, of course. True, the Arctic yacht *Blencathra* accompanied us, but, as I have always found it, the Kara Sea ice was no hindrance to the safe progress of the other ordinary steamers. With ease and pleasure we ran these and the huge *Orestes* up to Golchika, demonstrating that the largest of our merchant steamers can trade to these parts. This vessel, and Mr. Popham's yacht *Blencathra*, arrived safely back at Archangel, where the *Orestes* discharged the balance of her rails, and loaded full cargo for a home port. All this should now surely prove the Kara Sea to be a commercial route.

I must now turn to a subject which will, no doubt, interest you even more than our success—brave Nansen and his trusty companions with the *Fram*. You will have heard that they succeeded in passing Pett's Straits, a fortnight ahead of us; and that they held communication with the villagers of Khabarova, or St. Nicholai, as it is now named. Nansen, before he left home, arranged with us that he would deposit letters and despatches at this village; but though we searched and made inquiries of the priest and Russian traders there, we could not discover any such documents. I now find that the gallant leader took advantage of a more speedy mode of transit, by handing them to the messenger who brought him dogs, etc.; by this foresight on his part the news reached England much sooner. Since that time nothing more has been heard of this heroic band, for I regret to say we were unable to visit and inspect Dickson's Harbour either in the coming or the returning of the *Orestes* and *Blencathra;* the weather proved very bad both times, and Mr. Popham had to continue on his voyage, which being of a commercial nature, had its serious risks at stake in regard to a Government cargo and insurances, etc.

The question with respect to Nansen now is, how has he succeeded not merely in passing the Kara Sea, and perhaps visiting Dickson's Harbour, but rather how has he managed to pass the northernmost promontory of these Arctic shores, Cape Chelyuskin? I am rather afraid he has had some trouble, seeing that I found the drift-ice very close in-shore to the northward of Dickson's Harbour; but as our voyage did not admit of a deviation sufficient for properly inspecting that ice, and ascertaining whether or not it impinged closely on to the north-west land, I am unable to give a decided opinion as to success or non-success.

This I must say, I never before saw the ice in that vicinity so late in the season; still that must not be taken as a drawback or hindrance to the steady and successful progress of the *Fram*. I sincerely hope that the ice we saw was at a fair distance from the land, in which case we may perhaps have news, by way of the Lena, of the safe wintering of the little band at or in the vicinity of the New Siberian Islands; providing always that Nansen has an opportunity of communicating with the mainland. On the other hand, I should not be surprised to find that Nansen has gone farther to the northward, should the lead of the outer edge of the main pack permit of his doing so. In such a case we can have no further news of his doings until we hear of his safe return by way of the Pole, or retreat by way of the Novaya Zemlya seas, the Kara Sea, or the Siberian coast.

If you remember, I recommended his keeping, if possible, in the line of and near the meridian of Cape Chelyuskin, or not farther eastward than the 100th degree, and to avoid the dangerous vicinity of the New Siberian Islands. I hope he has been able to do this. Of course, should the trend of the heavy pack-ice edge lead him eastward, he is bound to go; but I much fear the shallow water and strong erratic currents of the Siberian Islands may cause them much trouble. I have been confirmed in this belief by the experience of Dr. Bunge, of the Russian Imperial Navy, who has been located on those desolate islands for the last five years. He has but just left that spot, where he has been making scientific inquiries, to join this, our present expedition from England.

On the other hand, should Nansen have been prevented from rounding the Chelyuskin Cape, or have been compelled to retreat to Dickson's Harbour for the winter, then we ought to have heard of him by the many natives who roam about those parts. This absence of news leads me to think that he has rounded the Cape, in which case I hope he has gone well northward, where the strong and steady currents from the Kara Sea join the stream of these mighty Siberian rivers. By this route I have every faith that the expedition will reach a high latitude, discover new lands, and perhaps closely approach the vicinity of the Pole itself.

Mr. Jackson left the *Orestes* at Pett's Straits, where he located himself in the house of the Priest at St. Nicholai; his desire was to examine the Yalmal Peninsula and the eastern shores of the Kara Sea. I hear that on the return of the *Blencathra* Mr. Popham found him still there, but I have not heard what his future arrangements were, or what he intends doing. Probably he may return home by way of the Pechora and Archangel.

We leave here in a few days, and hope to reach home by February at farthest. The Siberians gave us a grand reception here; this voyage of ours is a momentous event to them, opening out a new era for their country.

December 19th.

Just a line to say that we are now on the eve of our departure for St. Petersburg, and then home.

An interesting event has just happened—the arrival here of two gentlemen from the New Siberian Islands. They are Baron Toll and a naval lieutenant, who were commissioned by the Russian Government and certain scientific societies to make observations and take stores to the above-named islands, by way of the Lena River viâ Irkutsk, but they made a most interesting detour on their route home by coming direct from Yakutsk across the northern Tundras to Dudinka—some 1000 miles down the river—and sledging up to the city. I have not the track of their journey, so cannot send it you, but will endeavour to obtain it, as it is unique.

They are very much interested in Nansen's work. They report having landed stores, etc., at the northern islands of the Siberian group, and that dogs are awaiting Nansen in the vicinity of the Olenek River. So we must expect that Nansen has called there for these dogs, in which event news should soon reach this vicinity or Irkutsk, as the messenger with dogs would bring letters, as was the case with the messenger who delivered him the dogs at Khabarova. On the other hand, these gentlemen assure me that should Nansen require to retreat by way of the Siberian Islands and the Lena, or any part of the coast between that and Cape Chelyuskin, the natives have been given notice to assist.

Knowing the anxiety arising from the fact of our not having been able to communicate with Dickson's Harbour this season, I send this at once in order that the minds of all friends, etc., of Nansen's Expedition may realise the important fact that should any trouble arise to them, compelling them to retreat by way of the main coast, there will be assistance at hand. I may here state that next summer I shall make a point of calling in at Dickson's Harbour should there not be news in the interval of Nansen's whereabouts or safety.

The weather here is wonderfully mild for the time of year, so I hope Nansen may be able to push on northward. The Yenisei is not yet all frozen over—a thing almost unprecedented.

COMMERCIAL GEOGRAPHY.

By HUGH ROBERT MILL, D.Sc.

THE course of lectures on the Principles of Commercial Geography with special reference to the British Empire, the commencement of which at the London Institution was intimated in the November number, has proved successful, the attendance having been about two hundred. The first or introductory lecture has already been briefly noticed

(Vol. II., p. 455), and forms the ground-plan on which the earlier half of the course dealing with general principles was constructed. During the lectures large use was made of the lantern; a special collection of maps, characteristic photographs, and statistical diagrams having been prepared to illustrate the subject. Lectures II. to VI. discussed the principles or underlying conditions of Commercial Geography, while Lectures VII. to XII. were concerned with the application of these general principles to the actual conditions of the United Kingdom, India, and the larger colonies.

The fundamental importance of the form and motions of the Earth in relation to the sun formed the subject of the second lecture, which showed how the Earth as a ball would have no natural points of reference, or directions for measurement, if at rest. The fact of rotation, however, gives it polarity, and thus supplies initial points for reckoning latitude, and cardinal points for expressing direction; and, by the constancy of the direction of the axis, rotation also makes it possible to determine latitude and longitude astronomically. The relation of the direction of the Earth's axis to the plane in which it performs its orbital revolution round the sun determines the amount and duration of solar heat in different latitudes, the length of the day, and succession of the seasons. If the Earth's surface were all land or all sea, climate would be a mathematical function of latitude. As things are, the composite structure of the globe, in which the lithosphere is partially covered by the hydrosphere and the whole surrounded by the atmosphere, sets up a complex system of circulation in air and sea which tends generally towards an equalisation of climate. Not only climate but configuration also is changed in this way. The cooling lithosphere puckers into ridges and hollows, outlining the great features of continent, mountain range, and ocean basin, but the sculpture of the surface and all types of scenery and classes of soil are due to the power of the sun's heat acting through air and water. The resultant surface features farther modify the direction of ocean currents and prevailing winds, and so ultimately produce the balance of climate and configuration which at present exists, thus fitting the Earth to become the dwelling-place of plant and animal.

Geographical conditions are brought into relation by the theory of evolution with the origin not only of the distribution, but of the forms of living things. And in turn living organisms react on their environment, aiding or retarding the physical processes of change. The distribution of species is mainly dominated by the occurrence of geographical barriers isolating regions which may possess similar climate. Wide stretches of ocean, expanses of deserts and long snow-crested mountain ridges are most effective in this way. In plant life the main conditions of luxuriance are soil, water, air, and solar heat and light. Green-leaved plants in sunlight are the only known means for building up the substance of earth, water, and air into the innumerable products which

supply food, clothing, and shelter, all animals being entirely dependent, directly or indirectly, on plant life. Where soil is wanting, as on rocky mountain slopes, or water is wanting, as in arid deserts, or solar energy is wanting, as in the Polar Regions, plant life is impossible; although terrace culture may make the mountain side fruitful by retaining soil, irrigation redeem the desert, and, if it were necessary to cultivate the Polar Regions, electric light and artificial warmth could utilise the soil and moisture there. Zones of relative fertility are dependent mainly on climate, the map of deserts, steppes, and forests showing an intimate relation to those of temperature and of rainfall. Change of climate by altitude on mountain slopes produces effects on vegetation similar to those produced by latitude. The distribution of animals is subject to similar conditions, only in their case the effect of environment in producing adaptation is more marked, and the effects of isolation, especially in islands, on the distribution of species may be used to reconstruct hypothetically former geographical conditions that have left no other trace. Both plants and animals are agents in modifying the land surface; mangroves have reclaimed a broad strip of low ground from the sea on many tropical coasts, and strong-rooted grasses binding sand-dunes are often the only barrier between fertile farms and sandy desert. The humbler orders of life produce the largest geographical results. Minute shell-forming organisms, especially foraminifera and diatoms, cover the sea-bed with calcareous and siliceous deposits, and the little coral polyp raises whole groups of islands from a considerable depth to the surface of the sea. The Earth clothed with vegetation and busy with animal life stands ready for human occupation.

The classification of the human race is a problem of great difficulty, but, disregarding minor differences, all peoples may be grouped under the three heads of the Black, Yellow, and White. These, speaking broadly, show a close relation to their habitat, and represent definite stages in civilisation and enterprise. The lowest races of the Black and Yellow type inhabiting exclusively the torrid zone, are almost entirely subject to the tyranny of their environment, against which they are practically incapable of contending. These are the savage tribes whose civilisation, to the point of appreciating manufactured goods, is an object of much commercial importance. The higher races, of the Yellow and White types, living in the temperate zones have, no doubt largely on account of the stimulus of adverse circumstances, developed qualities of foresight, self-restraint, and enterprise which enable them to adapt themselves to new environments, and impel them to spread over the globe and dominate other races. Minor differences in national character, produced by race and nurture, may be intensified in suitable surroundings in a surprising way. For instance, the difference between the Teutonic races of North-West Europe and the Romanic people of South-West Europe is trifling compared with the contrast between the

same races when transplanted to North America and South America respectively. The higher the degree of civilisation, the more freely may a people range over the globe, and accommodate themselves for a time at least to the most extreme conditions. The bond of the people to the land becomes closer as tribes emerge from savagery or a nomadic existence, and begin to depend on the products of the Earth raised by their own exertions or on trade. Towns become necessary at some stage in this progress, and geographical conditions are most important in fixing on sites. Sites capable of ready defence have attracted round them most of the great cities of Europe which date back to turbulent times; sites favourable to free intercommunication have now become more important, and the changed conditions are beautifully exemplified in the contrast between the "old" and "new" parts of many towns. Places situated conveniently for access to mineral wealth have become, by a process of instinctive selection, the centres of population in recent years. The distribution of population over the Earth is sparse in deserts and steppe-lands; extremely dense in the lower stretches of great tropical river valleys where means of agricultural life abound; and densest of all on the coal and iron-fields of the temperate zone where the products of mine and forge enable the toiling people to purchase and transport from a distance their food and clothing material.

The resources of regions constitute the most important feature in commercial geography, as on them the welfare of the people must immediately depend. Commerce looks with a limited view on natural products; the conditions of utility, ease of production, and economy of transport overriding all others. Thus the geologist, botanist, and zoologist are equally interested in every stone, plant, and animal, but the commercial man, with the one test of "Will it pay?" divides these into mineral wealth and rubbish, plants and weeds, game and vermin. The useful or desirable things entering most largely into trade are those of primary necessity for food, clothing, shelter, and the means—such as machinery—for producing these. Products due to life, whether plant or animal, differ from others by the fact that they are capable of being improved in quality and increased in amount to any extent by human skill in cultivation and breeding. Only in a few cases, such as untamable fur and feather-bearing animals, rapid extinction of the species is a consequence of human interference. Mineral products, on the other hand, are practically limited in amount to that which already exists in the crust of the Earth within reach of the surface, and the supply once exhausted cannot be renewed in the lifetime of the human race. The important food and clothing materials of the world's commerce are restricted as to the area of their growth by climatic conditions, and by the supply of cheap labour or the application of machinery. Useful foods or fibres, indigenous to a small area, have by commercial enterprise been spread over the globe wherever natural conditions rendered it

possible for their culture to be made to pay. Maize, tobacco, and potatoes overspread Europe, Asia, Africa, and Australia from America; while wheat, sugar, and coffee were sent in exchange, and now form staples of American agriculture.

A set of diagrams showing the production, export, and import of wheat, serves well to enforce the general laws of trade-geography. In modern times it has been found that dazzling mineral wealth, such as gold, diamonds, or silver, was most powerful in attracting population to new countries. On the other hand, commonplace minerals, such as coal and iron-ore, enable the densest population to subsist on food and clothing imported from a distance and bought with the result of their labour, but in every place ultimate prosperity must depend—looking far enough ahead—on the agricultural resources, which will remain when minerals no longer pay to work; and only lands agriculturally self-supporting can, in the long run, retain their economic independence.

As the last of the underlying principles of commercial geography, it is necessary to consider the artificial limits and restrictions to which the name of political geography is specially applied. Viewing a nation as a group of people similar or diverse in race and language but associated together under an organised government treating with other governments through a recognised head in the corporate name of the people, and viewing a region as a natural division of the Earth's surface or a group of such divisions, a country may be defined as a region exclusively occupied by a nation. When the nation is homogeneous or of one race and language, and the land they occupy is a region in the strict sense of the word, *e.g.* a naturally defined unit of the Earth's surface, such as an island or peninsula, the resulting country is an ideal country presenting the maximum of internal stability. The delimitation of frontiers between adjacent countries is always necessary, the crest of a mountain range or the line of a watershed being as a rule more satisfactory than a river. The Vosges presents a stronger and more natural frontier between France and Germany than the Rhine; but the Danube in the Balkan peninsula is an effective frontier on account of its political (not its natural) peculiarities, as it is a neutralised international waterway separately administered. Mathematical frontiers, such as the meridians and parallels between Canada and the United States and between the Australian colonies, are impossible in countries of natural and gradual growth, and useful only when highly civilised nations take possession of the lands of relatively powerless tribes. Invasions by hordes and armies are recognised methods by which one nation acquires control over another. A more insidious invasion is that by foreign capital which, while leaving a complex political independence, has made South America an economic fief of European moneylenders. The character of organised governments has a distinct geographical distribution. Asia is the home of autocratic monarchies, Japan being its only constitutionally governed

country as yet. Western Europe contains almost the only monarchies limited by popular legislation, and America is the continent of republics. A fourth class of governments is that of the "responsible" British colonies, which, without the responsibilities of independent existence, combine the advantages of the monarchical and republican forms. The ultimate prosperity of a country appears to depend less on its political character than on the fact of its economic resources being sufficient for the wants of the people, or capable of being kept efficient by the mastery of the sea, which is the one world-wide pathway of trade.

The United Kingdom of Great Britain and Ireland may be taken as the type of a country dependent mainly on mineral wealth and industrial occupations. It is distinguished from the other countries of Europe by its isolated position, its free yet orderly system of government, the voluntary character of its army and navy, and the entire freedom of trade, which is restricted legislatively only in so far as is necessary for excise purposes and the protection of workers. After passing through the stages of being a great pastoral and agricultural country, the British Islands are now practically dependent on the wheatfields and cattle-ranches of other countries for food, while the life of the nation depends on mineral and industrial wealth. Coal buys bread, not so much by direct exchange, as by the utilisation of coal to manufacture native or important raw materials, and so enhance the value as to make exports pay for imports. Thus the vital centres of the country are scattered over the coalfields and the coast, where manufacture or trade can best be carried on. When the coal supply is exhausted, wind, water, and tidal power must be employed, and the busy centres will migrate to the Highlands and the tideways.

As an example of a country with an immense population dependent almost entirely on agriculture, and thus on climate, no land approaches India. Climate is nowhere else so clearly dependent on configuration. Points of access for foreign trade are limited to a few seaports, which by their small number have become individually great. The people, compounded of the most diverse and antagonistic elements, are kept at peace though not redeemed from poverty by a resident population of Europeans, numbering only one to every 2500 natives. An Oriental country, India requires autocratic government for the proper development of its resources, and the adjustment of differences arising from race and creed. To the natural products of cotton, oil-seeds, rice, and tea, there have been added by introduction from abroad wheat, maize, cinchona, and many other products.

Tropical colonies are of value mainly as strategic points on trade-routes, coaling-stations or harbours, and as fields of production in plantations manned by native labour. Thus Aden is valuable as a station on the way to India, Hongkong as a trading post with China, Singapore as a collecting and distributing point for tropical products and European

manufactures; Ceylon, Mauritius, and the West Indies as plantation colonies producing commodities which cannot be grown in temperate lands or by white labour.

True colonies must lie in the temperate zone or at least enjoy a temperate climate. Of these the most important are South Africa, the Dominion of Canada, and Australia. The two latter groups of colonies were made the subject of separate lectures, their characteristic geography and the special products and trade of each being referred to in detail and illustrated by special maps.

The concluding lecture on December 19th was a review of the resources and commerce of the British Empire as a whole. In this respect the temperate colonies are most important, forming the nuclei of future countries with vast room for expansion; thus in Australia twelve times the area of the United Kingdom is awaiting occupation, and in Canada twenty times the area. The means of communication on the great trade-routes is mainly by steamers, although there are again signs of a considerable increase in the proportion of sailing vessels employed. The carrying trade of the world is mainly done by British steamers either under the national flag or under the flag of other nations. One-third of all the sailing vessels in the world and two-thirds of all the steamers engaged in trade belong to the United Kingdom. At least 52 per cent. of all the tonnage afloat flies the red ensign, but the war navy of the empire does not bear the same overpowering ratio to that of other countries. If the trade routes of the world may be compared to the arteries of commerce, the telegraph system plays the part of the nerves. The greatest gap in the telegraph system which remains is the want of a cable across the Pacific to correspond with the new steamer routes which now traverse that ocean.

Compared with the trade of all other countries, that of the United Kingdom is first both in volume and value of exports and imports, the combined value being nearly twice that of France, Germany, or the United States, which are nearly equal. A map of the world was shown with the countries coloured to bring out their importance to British trade as fields for the supply of food and raw materials as imports, and as markets for the sale of manufactured goods sent as exports.

GEOGRAPHY AT THE WORLD'S COLUMBIAN EXPOSITION.

By CHARLES T. CONGER, B.A.

THE first lesson in geography which confronted the visitor to the World's Fair was the topography of the grounds. He had to find his bearings and locate the numerous buildings situated about the beautiful Court of Honour, and the picturesque waterways that penetrated every-

where, and gave a Venetian aspect to the scene, only more serene and beautiful. Nature appealed to the visitor on every hand. The brightness of the American climate, the great blue expanse of Lake Michigan, and the landscape features combined to impress one pleasantly.

The historical and geographical element entered largely into nearly all of the exhibits. As was to be expected, the most elaborate geographical exhibit was found in the United States Government building. The Department of War, which controls all rivers and harbours, presented a great number of relief models of the rivers whose courses and mouths are undergoing improvement. The elaborate process of jettying the Mississippi River, the famous deepening of part of the East River by New York, known as Hell-gate, and the Columbia River in Oregon, were shown in a highly interesting and instructive manner. There was also a model of the celebrated Sault Ste. Marie Canal, connecting Lakes Superior and Huron. The new lock is 100 feet wide throughout and 800 feet long, has a depth over the sills of 21 feet, and is to be worked by hydraulic engines actuated by turbine wheels. The importance of this improvement will be seen from the fact that in 1892, during a navigation season of only two hundred and thirty-three days, twelve thousand five hundred and eighty vessels passed through it, having an aggregate registered tonnage of 10,647,203 tons of 2000 lbs. each, and carrying 11,214,333 net tons of freight. This exceeds the Suez Canal in tonnage but not in value.

Another model showed the methods used in storing water in great reservoirs at the head-waters of the Mississippi River, which is systematically released to raise the summer levels of the river. Another showed the extensive process of sand-bar cutting and river straightening, in operation between the mouths of the Ohio and Missouri Rivers.

Arctic exploration was represented in a large map showing the polar latitude attained by the various nations, and by a striking panoramic scene of General Greeley's camp at Fort Conger. Relics and pictures of the unfortunate *Jeannette* expedition were numerous. The routes and plans of Nansen and Peary, past and prospective, were presented in a graphic way, which attracted crowds and indicated that there was considerable popular interest felt in geographical exploration.

The territorial growth of the United States by purchase and annexation, the extent of the land grants to railways, the location of the Indian Reservations, were portrayed in a series of large maps arranged according to a chronological system.

The Hydrographic Office, a sub-department of the U.S. Navy, collects, compiles, and distributes gratuitously to mariners and others interested in nautical matters such information as they could not otherwise get. Chart construction and marine meteorological observations were represented at the model observation station on board the war-ship *Illinois*. The whole process of chart construction from rough record

books and plotting sheets to the final finished printed map were admirably portrayed. Complete sets of Coast Survey, Lake Survey, and British Admiralty charts, as issued to vessels of the U.S. Navy, together with storm, ice and derelict charts, were shown to indicate the scientific and practical value of the department's work.

By far the finest feature of this exhibit was the relief map of the Atlantic bed, constructed on the polyconic projection on a scale of 1 : 100 of an inch to the nautical mile for horizontal measurements, and exaggerated fifty times in the vertical. It showed the various submarine telegraph lines, and the general orographic features of the bottom of the North and South Atlantic, and also the zones of successive depths between the surface and 1000 fathoms, 2000 and 3000 fathoms by deepening shades of green. The model was one of great beauty and suggestiveness, far excelling any map in portraying mountains and valleys beneath the sea. A similar relief model of the West Indies and the Caribbean Sea on the polyconic scale of 1 inch = 33 miles for horizontal scale, and exaggerated thirty-three times in the vertical, showed clearly the characteristic features of the bottom of this sea, and the surrounding shores and islands. The highest land shown is in the Sierra Nevada de Sta. Marta in Colombia, 16,419 feet above the sea-level, and the greatest depth in depression, north of Puerto Rico, 4561 fathoms.

Deep-sea-sounding instruments, plane tables, telemeter staffs, storm charts, wreck charts, and ice charts indicated the extensive and invaluable work executed by the department.

One interesting exhibit was that of a model of the United States and Alaska, as if cut from a sphere 42 feet in diameter, which would show physical features reduced to one millionth of their natural size. For convenience of transportation the model was built in eight sections. Of these the United States occupied four, each 15° of longitude in width; and Alaska three, each 20° of longitude in width. The eighth was long and narrow, 10° of longitude and 34° of latitude, and formed the connecting-link between these two portions. The position was so arranged that the axis of the spheroid was perpendicular to the floor. Contrary to the usual custom pursued in making relief maps, the vertical scale was the same as that for horizontal distances. If a certain pictorial effect is thus lost, a proper conception of the relative insignificance of mountains in relation to the sphere is gained. They appear as a mere roughness of a smooth surface. At numerous points magnetic needles have been mounted, showing actual compass bearings. By this means a rough idea of magnetic variations is given. The character and progress of the primary triangulation along the 39th parallel between the Atlantic and Pacific are also shown.

The admirable work of the well-known U.S. Geodetic and Coast Survey was well exhibited by a large number of instruments, models, charts, and publications. Great trouble was taken to exhibit and explain

to the unscientific the Triangulation Survey of the United States, the different types of base apparatus, gravity pendulums, tide-gauges, deep-sea current-meters, and the various methods of determining time. The important magnetic data collected from the 897 stations and four magnetic observatories of the survey have been collected and mapped upon the globes correct for the United States and assumed for the rest of the world. These globes have a diameter of one meter, hence are about $\frac{1}{12,750,000}$th part of the natural size. On each are shown two systems of magnetic curves. On globe No. 1 the red lines refer to declination, and in numbers attached give the angle in degrees. The areas where the north end of the needle points west of the meridian are tinted buff, the areas pointing east are indicated by a light blue colour. The agonic line of no variation is shown to pass through both the geographical and the magnetic poles. Globe No. 2 exhibits in red curves "magnetic meridians;" green curves show the isocliniclines. North of the magnetic equator areas are tinted light blue; south, of a buff colour.

Each of the States exhibited relief models of considerable size, showing the location of important mountain ranges, river-courses, and most important cities. These were the centre of great interest and not without their educational value. The graphic element prevailed throughout the Fair. Familiar knowledge and wearisome statistics were plotted in such a manner as to be highly attractive and instructive.

In the Convent of La Rabida were kept the valuable collections lent by the Spanish and Italian Governments, as well as the various pre-Columbian maps and relics owned by private collectors. Many of these will remain as part of the new Columbian museum, to be formed and kept in the fire-proof art gallery which is to remain in Jackson Park.

The Ordnance Survey and the Geological Survey of the United Kingdom were fairly well represented. The Hakluyt Society exhibited a set of publications of the Society from 1848 to 1892.

The Germans made the best exhibit of educational works in Geography. All the best German map-publishers had specimens on exhibition, either at the German building or in the elaborate German exhibit in the Manufactures and Liberal Arts Building. The work of the universities and learned associations was shown in detail. The French and British exhibits left much to be desired. The Royal Geographical Society's little book-case filled with its publications was overlooked, and lost in the maze of other material. The Society's great map, showing how much had been done for North American exploration by British explorers, was the centre of marked interest, and made one wish that the Society had dived deeper and brought forth more of its geographical treasures.

It may be interesting to note here that the new University of Chicago, in conformity with its broad and liberal plans, has recognised geography

as a suitable university subject by establishing two courses in geography. One is a thorough course in physiography and landscape geology, while the second, under the head of political geography, treats especially of anthropo-geography and historical geography. The Royal Geographical Society, in recognition of this effort to promote geographical instruction in American Universities, has presented the Society's publications exhibited at the World's Fair. It is to be hoped that the new courses will meet the same favour in Chicago that has marked them at Cambridge and Oxford.

ITALIAN EXPLORATIONS IN THE UPPER BASIN OF THE JUB.

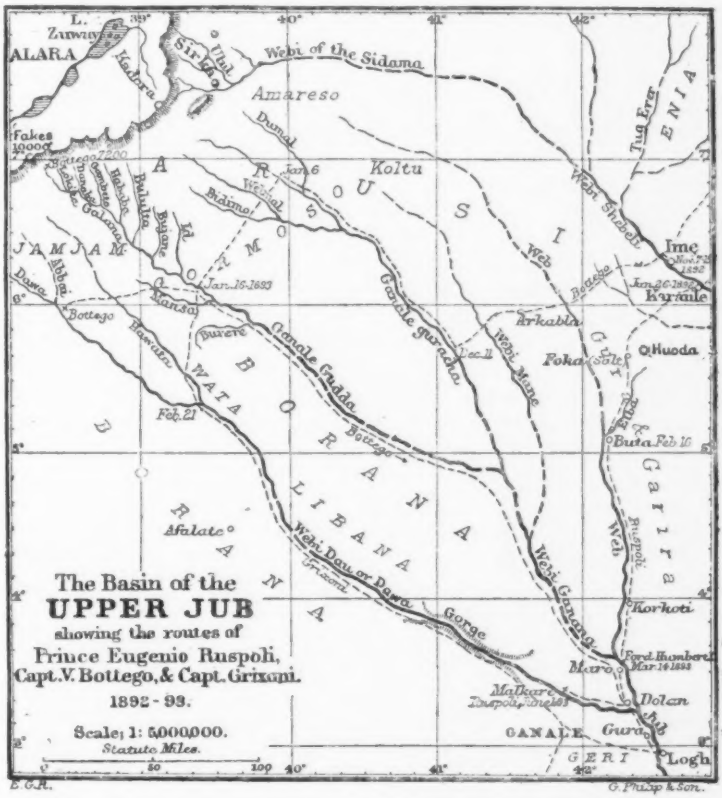
By E. G. RAVENSTEIN.

THE upper basin of the River Jub has in the course of the last two years been the object of various Italian expeditions; and although it cannot be said that all problems connected with that river have been solved, still very considerable additions have been made to our knowledge of a part of Africa which hitherto appeared as a blank upon our maps, or was at most delineated from conflicting native accounts. The sketch-map which accompanies this article shows at a glance what has been done by two of these Italian expeditions; namely, those conducted by Captain Vittorio Bòttego and Prince Eugenio Ruspoli. It is quite preliminary, being based upon the very desultory letters of these explorers and the sketches published by Professor Della Vedova in the *Bollettino* of the Italian Geographical Society.* Neither of the two observers named appear to have determined even their latitudes by astronomical observations, and the honour of enabling us to lay down correctly the head-streams of the Jub upon a map is consequently reserved to some future explorer.

Captains Bòttego and Grixoni left Berbera on September 30th, 1892, with one hundred and twenty-four men. On November 7th they reached the Webi Shebeli, or "Leopard River," at Imé, a place recently visited by Captain Swayne, who approximately determined its position. On the 15th they crossed the river, by a ford, and at once entered the country of the Arusi Galla, who proved hostile throughout, and with whom Captain Bòttego had several conflicts. The country was hilly, covered with bush, and wanting in water, but it improved as the expedition neared the mountains of Ethiopia. Acacias and mimosas still prevailed, but there were also euphorbias and sycamores, and around a few Galla villages durra was being cultivated. The Web, the first head-stream of the Jub, took its course through a belt of verdure; but

* See more especially the *Bollettino*, 1893, pp. 621 and 688; also *L'Esplorazione Commerciale*, November, 1893.

beyond it there once more extended an arid plain; in the midst of it, near a small lake, lay the populous village of Arkebla, whose inhabitants (Somal and Galla) were rich in cattle and sheep, and cultivated durra. On nearing the Webi Mane, which, like the Web, is bordered by dum-palms, the plain became dotted over with conical hills. One day's march beyond the Mane, on December 11th, Captain Bòttego arrived at the Ganale Guracha, or Black Ganale, a river about 100 yards wide,



the turbid foaming waters of which rushed along between rocky banks. He ascended the river for twenty days, the country throughout being poor and rocky, and void of inhabitants, except near its confluence with the Welmal, where a few Gormoso Galla were met with.

Finding that this "Black" Ganale could not possibly be the main branch of the Jub, Captain Bòttego left it in a west-south-west direction; and crossing a broad, sterile plain, roamed over by the neigh-

bouring tribes of the Gormoso, Jamjam,* and Amaresa, he arrived on January 16th, 1893, on the Ganale Gudda, or "Great" Ganale. When forded, that river was found to have a depth of 4 feet. Captain Bòttego, who suffered from fever, here built a "zeriba." His companion, Captain Grixoni, left for the coast on February 15th with thirty men, and there remained with his chief sixty-five men, fifteen camels, etc.

Four days after Captain Grixoni's departure, Captain Bòttego started for the upper river, which is known in its upper course simply as "Galana," the Galla word for river. The Arusi Galla proved hostile. They attacked the caravan thrice, and three thousand five hundred rounds were expended in repelling these attacks. Ultimately, when within sight of Mount Fakes, which rises to an altitude of 10,000 feet, Captain Bòttego felt constrained to retreat, for raiding parties of Abyssinians were said to be in front, and he felt no desire to come into contact with them. After a futile attempt to cross the country in a southerly direction, he returned to his old camp among the Gormoso.

He then crossed the tract separating him from the Dau or Dawa, and ascended that river until want of provisions compelled him to beat a retreat. The Ganale Gudda was once more reached after six forced marches, in the course of which eleven men died of hunger. Two more died in camp from exhaustion, and two were drowned whilst hippopotamus hunting.

Having laid in a supply of dried hippopotamus flesh, Captain Bòttego descended the Ganale Gudda as far as Logh, where he arrived on July 17th last. On September 8th, 1893, he once more reached the coast at Barawa.

Captain Grixoni's return journey to the coast was effected by a different route. Five days after he had left his chief on the Ganale Gudda he reached the Hawata, which is a tributary of the Dau. He there came in contact with the Wata, a negro tribe living among the Borana Galla, tall and muscular, intensely black, with short, woolly hair, and naked except for a loin-cloth. They live on fish, roots, and hippopotamus flesh. Following the Hawata he reached the Dau, which was hardly ten yards wide, and seemed to be inferior to the Hawata in volume. The Dau or Dawa took its course though a broad plain, which narrowed gradually, until the river entered a narrow gorge bounded by rugged mountains, difficult to cross. On its left bank dwelt the Libana, on its right the Borana and Wata. The mountains bounding the gorge are uninhabited, and it was only after having emerged from them that Captain Grixoni again met with natives. They were Geri Somal searching for honey. Leaving the river, he crossed the fertile district of Ganale and arrived at Logh on March 15th.

---

* The Jamjam are evidently the Janjan of Sheet 3 of my map of Eastern Equatorial Africa (1883), whose cattle, horses, and sheep are all said to be black.

He then proceeded by way of Bardera to Barawa, which he reached on April 5th.

The expedition led by Prince Eugenio Ruspoli has not, up to the present, yielded results equal in importance to those achieved by Captain Böttego, but the Prince is still in the field, and proposes to push on as far as Lake Rudolf.

Prince Eugenio left Berbera on December 6th, 1892. At Herer he met the Duke of Orleans and Prince Boris on their return to the coast, and on January 23rd, 1893, he reached the Webi Shebeli at Karanle, and crossed it in a boat. The Webi there is about 60 yards broad and 28 feet deep when in flood. The vegetation along its banks is luxuriant, and the natives (Somal and Galla) cultivate durra, cotton, and beans. Cattle and sheep are numerous.

On the road to the Web the Prince crossed the Huoda (Audo?) mountains, beyond which begins the country of the Gura and Garira Galla, where salt is found.

The Web has a fringe of luxuriant vegetation; dum-palms and acacias are the most prominent trees, and the sacred lotus of the Egyptians is also met with. Elephants are numerous, and so are hippopotami. The Prince followed the river downward for twenty-five days, and reached its confluence with the Webi Ganana on March 14th. Whilst the Web varied in breadth between 60 and 160 feet, in depth from 10 to 16 inches, in volume from 3 to 4 cubic yards per second, the Ganana, or main branch of the Jub, measured 310 feet across, had a maximum depth of 3·6 feet, and a volume of over 80 cubic yards. When in flood, the width of the river increases to 560 feet, its depth to 14 feet. Prince Eugenio forded this river on the King of Italy's birthday, and established himself near a deserted village in Maro.* Here he left the bulk of his caravan, and proceeded down the river to Logh and Bardera. Logh he describes as a real town, defended by mud walls, and the centre of much trade, caravans arriving almost daily. The imports include rice, sugar, dates, coconut-oil, and cotton stuffs from the coast; cattle from the Webi, and ivory from the country of the Borana Galla. The river above Logh is navigable.

When on his way back to the Maro camp, Prince Eugenio met the whole of his people a day's journey beyond Logh. They had abandoned their camp, owing to sickness and want of provisions, but the Prince turned them back at once; and when last heard of, on June 1st, the whole expedition was encamped at Malkare, four marches up the Dau or Dawa.

It results from these explorations that the Webi Ganana, or Ganale Gudda, is the main branch of the Jub, whilst the so-called Webi of the

* The Prince named his camp Mogala ("country") Umberto I. Malo may be identical with the Marra on the Society's map of Eastern Equatorial Africa.

Sidama represents the Upper Webi Shebeli, or Haines River; and that these rivers, as well as the other head-streams of the Jub, rise in a range of mountains in the country of the Arusi Galla, which bounds the valley of Lake Zuway. The Gibbe, or Omo, seems to have no connection with the Jub, although it is as yet by no means certain that it reaches Lake Rudolf. Indeed, Dr. Traversi was most distinctly assured by an Abyssinian general, who recently raided in these regions, that it flowed to the east and not in the direction of the lake named.* Much work, therefore, still remains to be done by future explorers.

HYDROGRAPHY OF THE EASTERN MEDITERRANEAN.†

The Austro-Hungarian ship *Pola* was again sent out last summer, by the Vienna Academy of Sciences, to the Eastern Mediterranean. Another deep depression has been discovered, this time to the east of the island of Rhodes, in latitude 36° 5′ 30″ N., longitude 28° 36′ E., where the lead gave 3865 mètres (2110 fathoms); and although this depression is apparently shallower than the "Pola-Deep," 4000 mètres (2187 fathoms) in latitude 35° 44′ 20″ N., longitude 21° 44′ 50″ E., to the west of Crete, it is really deeper in relation to the land surrounding it, being fully 7000 mètres (3828 fathoms) below the summit of Ak-Dagh in Anatolia. The new depression is closed to the south-east by a ridge running in a south-easterly direction, which rises to within 1920 mètres (1050 fathoms) of the surface.

As in former years, the chemical character of the sea-water was determined by Dr. K. Natterer, and his investigations appear to him to confirm some previous results, which suggest some remarkable alterations in the accepted theory of the formation of certain geological strata. Dr. Natterer has again been unable to detect the presence of free carbonic acid in any of the samples of sea-water. Since a considerable amount of carbonic acid must be derived from the oxidation of plant and animal remains at the sea-bottom, its absence in the free state can only be explained by supposing that, besides carbonic acid, ammonia is formed, and that in almost equivalent quantities. These substances, having a tendency to combine, would go to form a corresponding amount of carbonate of ammonium.

Dr. Natterer is inclined to assign the chief part in the formation of not only the partly clayey, partly stony deposits on the sea-bottom, but also of calcareous and siliceous structures in living organisms to precipitates caused by the dissolved carbonate of ammonium. That the

---

* See *Bollettino*, 1893, p. 687.

† From our Vienna Correspondent, Dr. K. Peucker.

mechanical deposition of detritus carried to sea in suspension by surf or by river-waters plays only a subordinate part in comparison with such chemical precipitates (of carbonate of lime, siliceous clay, free silica, etc.), appears especially from the fact that, except near the mouths of rivers, clear water, free from suspended matter, was obtained directly from the water-bottles at all depths in the Eastern Mediterranean; and Dr. Natterer accordingly expresses the view that in the *Porcupine* and *Shearwater* expeditions in 1870–71, it was only because the Sigsbee apparatus was allowed to touch the bottom that fine mud was found in suspension in samples from the lowest layers of water.

The late Dr. W. B. Carpenter, who had scientific charge of those expeditions, ascribes the presence of suspended mineral particles to the fine sand brought down by the Rhone and other rivers (see *Proceedings* R.S., xix., p. 146, and xx., p. 535). The relatively slight importance of the action of mechanical deposition is further shown by the circumstance that where the chemical conditions necessary for precipitation are absent, mineral particles are dissolved by the sea-water, except when they are present in sufficient quantity to cause the continued reactions observed by Natterer. In fact, the examination of water samples collected at the Tanitic mouth of the Nile, and near the harbour of Port Said, towards which all Nile water is carried by an easterly current, after it reaches the sea showed a surprisingly small amount of suspended matter even in late summer, when the quantity is likely to be large on account of the tropical cloud-bursts. Natterer supposes that the fine sand brought down by rivers is only to a small extent deposited directly, but that for the most part it is first dissolved, and remains in solution until a current carries it to a part of the sea where new conditions bring the separating action into play, and precipitation is caused by the action of living or dead organisms. This process assists in the formation of coral reefs and banks, helps the tide and the surf in the building of dunes, and provides materials for the mineral parts of organisms living in the sea.

Where the sinking of decaying organisms is prevented by a strong current, Natterer supposes that a strong crust is formed on the bottom, instead of the muddy deposits which cover by far the greater part of the Mediterranean basin; and this crust is harder the more slowly it is formed. Samples brought to Vienna prove the existence of intermediate transition stages between the two, and it is suggested that the ammonia, formed by the oxidation of the lower layers of deposits containing decaying organisms in the manner already described, rises to the actual sea-bottom by diffusion, and there causes the deposition of the stony crust by its action on the sea-water. The crust, which is chiefly composed of carbonate of lime, siliceous clay, and free silica, varies in thickness from about 1·5 centimètres (0·59 inches) to 8 centimètres (3·15 inches), and tends to obliterate the inequalities of the original

sea-bottom. Its upper surface is likely to be smooth and clean, while the lower is in immediate contact with the clayey sand.

Dr. Natterer also draws some interesting conclusions from the application of a special chemical method, based on local variations in the amounts of bromine, of iodine, and of nitrous acid contained in sea-water, to the detection and measurement of currents which move too sluggishly to be amenable to direct observations. He has this year been able to subject his method to a severe test in the currents of the Ægean, where it is possible to make direct measurements for comparison; and although the results are not yet fully worked out, the two methods agree very closely. Finally, with regard to the extraordinary poverty of the pelagic fauna of the Mediterranean as compared with the open ocean, Dr. Natterer expresses the opinion that so far as chemical conditions alone are concerned, these are favourable to animal life, and that as a matter of fact a rich fauna occurs in some regions in the immediate vicinity of quite sterile masses of water. It appears that abundant animal life is present just where the water is in rapid motion; and that, generally, the poverty of the Mediterranean fauna is largely due to the want of circulation in its waters—a result opposed to that of Carpenter, who believed it to be due to the excess of suspended matter.

THE MONTHLY RECORD.

THE SOCIETY.

Geography at Cambridge.—Mr. H. Yule Oldham, who succeeded Mr. J. Y. Buchanan as Lecturer in Geography at the Cambridge University, entered upon his duties last term. Throughout the term Mr. Oldham's lectures were well attended, and there is reason to hope will be equally well attended during the term just begun.

EUROPE.

The Forests of Abkhazia.—In a paper on the botany of Abkhazia ('Memoirs of the St. Petersburg Society of Naturalists,' vol. xxiii., Botany, 1893), N. Alboff, who is now working on his large collection of over one thousand three hundred species of phanerogams, points out the following typical features of Abkhazian forests. Their composition is very varied, no less than thirteen species of evergreens, six conifers, and eighty-six deciduous trees and shrubs being found in those forests. Climbing plants are prominent at the lower levels. A striking feature is the extremely wide vertical range of certain species. Most of them have a range of from 3000 to 4000 feet, while some (beech, walnut-tree, azaleas, *Rhododendrum ponticum*, *Ilex aquifolium*, and several others) extend from the sea-level to the uppermost limits of tree vegetation at an altitude of about 7000 feet. At this high limit they are then met with side by side with birch, mountain ash, *Ribes petræum*, *Viburnum lantana*, *Quercus pontica*, *Rubus Idæus*, *Rhamnus alpina*, and other alpine bushes, such as *Rosa mollis*. Nearly twenty-five species of ferns are

also met with in the forests of Abkhazia. M. Alboff further confirms the remarks of Engler and N. Kuznetsoff relative to the similarity of the West Caucasian flora with that of the tertiary period.

ASIA.

Chinese Map of Tibet.—In publishing,* in a European dress, a section of what may be called the "Chinese Atlas of Asia," Dr. Wegener has performed a piece of work which is not only interesting, but useful, for he has judiciously selected just that region of Asia where modern cartographers have been able to do least, and for the geography of which we are still, to a great degree, dependent on Chinese maps. It is true that these maps are not entirely of Chinese construction; indeed, the author of the pamphlet explains briefly the conditions under which they were made. It may be said that Europe is indebted to the enlightenment of the three earliest (effective) Emperors of China of the present Manchu dynasty (Kanghi, Yungching, and Kienlung, whose united reigns lasted a hundred and thirty-five years), and that, on the other hand, the Emperors owe the maps of their possessions to European science and method, as exercised by the Jesuit missionaries at and about their court. A list of these mathematicians, astronomers, and surveyors would contain many illustrious names, and Dr. Wegener mentions especially those three whose work lay chiefly in the region of which his paper treats. These were d'Arocha, Hallerstein, and Espinha,† but there were many others, equally able, who carried on surveys within and beyond the Empire, such as Gerbillon, Verbiest, Jartoux, Régis, and several more; besides those who worked on the computations and the construction of the maps (Adam Schaal, Benoit, and others), or taught and trained Chinese pupils in geographical surveying, much in the same way that our Survey Department in India, in recent times, has trained the native explorers. One region alone—Tibet—as Dr. Wegener points out, was in the last century, as now, closed to the European missionaries, even though they were serving the suzerain emperor of the time, and it was here that the Chinese explorers who took their place did the work which still forms, to a great extent, the basis of our maps of Tibet. The original Chinese atlas was, as Dr. Wegener explains, published in 1718 (it is believed at Peking) during the reign of Kanghi, but it contained little more than maps of the eighteen provinces of China proper. In 1863 a new edition was brought out at Wu-chang-fu, the capital of the province of Hupeh. This was so much enlarged as to extend over the whole of Asia and even a part of Europe, and for this reason it may be called "a Chinese atlas of Asia;" and it is a section of the new edition that Dr. Wegener and Herr Himly have now translated and made accessible to Western geographers. The full Chinese title is *Ta-Tsing i tung yü tu*, or "General Map of the Tsing Empire," and a copy of it, presented by Mr. H. G. Hollingworth, is among the maps of the R.G.S. Attached to the section now reproduced in German, are two useful indices of names as translated by Herr Himly, whose work seems to have been most carefully performed. He has not merely given the sounds of the Chinese characters, which profess to represent those of the original Mongolian, Tibetan, Turki and Tangut (a purpose for which the Chinese language is singularly deficient), but he has gone, wherever possible, to those languages themselves, and from these has transliterated the names into German—a task requiring no small labour and research.

---

* 'Nord Tibet und Lob-nor-Gebiet in der Darstellung des Ta-Thsing i thung yü thu.' . . . Von Dr. Georg Wegener. Sonderabdruck aus der *Zeitschrift der Gesellschaft für Erdkunde*, 1893.

† Some account of these three surveyors, by Mr. N. Elias, will be found in *Ocean Highways* for February, 1874.

The North Siberian Expedition.—According to the latest news received by telegram by the Russian Academy of Sciences, the expedition to the New Siberian Islands and the coasts of the Arctic Ocean, which went out under Baron Toll, has been quite successful. In the spring they visited, on sledges dragged by dogs, the Kotelnoi and the Liakhov Islands. In the summer they went, on reindeer, from Sviatoi Nos across the Tundras and the Khardulakh range, to Bulun, and thence in a boat across the delta of the Lena and eastwards to the mouth of the Olenek. From Volkolakh they proceeded again on reindeer along the sea-coast to the mouth of the Anabara, and up this river to the northern limit of the forests. During the winter the region between Volkolakh and the Khatanga was surveyed. The latitudes and longitudes, as well as the magnetic elements of no less than thirty-eight stations have been determined. The geological and palæontological materials collected are important for the geology of the region, and contain a solution of the questions which the expedition had in view, especially as regards the Anabara River. The spring this year was early, the summer hot, and during the autumn the weather was excellent. All members of the expedition are in good health.

Exploration in Siberia.—The construction of the Siberian Railway is giving a considerable impetus to geographical exploration both in Siberia and in Eastern and Southern Russia. As to the railway itself, it has been decided to build the line up the Usuri to Khabarovka as soon as the coast section from Vladivostok to Grafskaya is ready. The necessary surveys are already in full swing. Besides, as the main line will pass to the south of Tomsk, a branch line to the capital of West Siberia has been decided upon. Another main line, to connect Central Asia with South-eastern Russia, is planned, and at a recent meeting of the Russian Geographical Society Mr. Nikitin made a communication relative to his explorations in the Trans-Ural steppes and the Ust-Urt for that purpose. Two lines have been surveyed,—from Uralsk to Guriev and Kungrad, and another *viâ* Uil; attention being given by the way to the naphtha wells and the rich salt lakes of Indersk. The best direction proved to be that which leads through the Lower Emba to Lake Indersk and Alexandrov Gai.

AFRICA.

A Journey up the Cross River.—We have received from the Foreign Office a copy of a letter from Sir Claude Macdonald, K.C.M.G., H.B.M. Commissioner for the Niger Coast Protectorate. It is dated Old Calabar, November 26th, 1893. We give the following extracts:—"On October 30th I left Old Calabar in the sternwheeler *Beecroft* for the purpose of proceeding, if possible, to the Rapids of the Cross River. The *Beecroft* is a sternwheeler 100 feet long, 20 feet beam, and draws 3 feet. This river was first navigated as far as the Rapids in 1842 by Governor Beecroft in the *Ethiope;* since that time no craft larger than a canoe has been up. Mr. King, surgeon of that vessel, made a chart which had been embodied in the Admiralty chart of the Calabar Coast; I was fortunate enough to have the chart with me. I had been compelled to delay this expedition to almost the end of the rainy season, which however has this year been exceptionally heavy. We succeeded in passing the so-called Rapids, and stayed the night at a village some 3 miles above them; the natives said that we could proceed for another two days, when we would come to the Falls, and then some days' land journey beyond that we should find "more white men," evidently the Germans in the Bali country behind the Camaroons. I would have proceeded up to the Falls, for although our coal was nearly exhausted we could have cut wood, but unfortunately the river commenced to fall and fell 9 feet in twenty-four hours; so, not wishing to risk the ship, I reluctantly returned.

My party consisted of Commander Dundas, R.N., who navigated the sternwheeler, and Mr. Billington, Curator of the Botanical Gardens at Old Calabar. I propose forwarding to your lordship by next mail a report on this river, accompanied by a chart and botanical notes. The chart will be almost a copy of the one made by Mr. King in 1842, and which is most correct; the names of many towns and villages which have either sprung up since Governor Beecroft's visit or were not put in by him will be added. The Upper Cross River is densely populated; the people were throughout most friendly, and begged us to return next rainy season."

Determination of the Position of Antananarivo.—At a recent meeting of the Academy of Sciences in Paris (*Comptes Rendus*, No. 13, vol. cxvii.), Mr. Alfred Grandidier announced the satisfactory determination by Father Colin of the latitude and longitude of the Ambohidempona observatory near Antananarivo, the capital of Madagascar. The latitude and longitude were given by Rev. Mr. Mullens in 1875 as 18° 56′ 30″ S., 46° 40′ E., and by Rev. W. Johnson in 1882 as 19° S. and 47° 45′ E. In 1869 M. Grandidier fixed the position of the French cathedral as 18° 55′ and 47° 31′ 29″ by means of a small theodolite, not specially accurate. Father Colin fixed the latitude by means of fifteen series of observations embracing one hundred and fifty-six stars, using a portable transit circle by Rigaud. The observations were made difficult by the incessant tremor of the mercury in the artificial horizon, due probably to the continuous easterly wind, but the determination for latitude may be viewed as accurate, being 18° 55′ 2·10″ ± 2·18″ S. Longitude was determined by the same transit circle by the method of luna-culminations, thirty-nine determinations being made with reference to five hundred and sixty-one stars, the mean time-difference from Paris being found as 3 hours 46 secs. ± 4 secs., corresponding to longitude east from Greenwich 47° 31′ 44″ ± 1′. The time difference between Ambohidempona observatory and Tamatave was found by telegraphic observations to be 7 min. 35·4 secs.; and as the longitude of this seaport is fixed by numerous chronometer and lunar observations, the result for the capital is deduced as 47° 31′ 22″ E., only 22″ different from the direct determination.

AMERICA.

The Climate of British Columbia.—The annual report of the Canadian Department of the Interior for the year 1892, just received, contains, among others, the report of Mr. E. Deville, the Surveyor-General, containing a few interesting particulars regarding the climate of British Columbia. The prevailing winds are from the west, and in striking the coast range they are deflected upwards, and deposit a heavy rainfall in consequence of the resulting cooling. After passing over the coast range the air comes down into the slightly lower region around Kamloops, where, being heated, it is always dry. Pursuing its course eastwards, it soon strikes the western slope of the Selkirks—the highest range of the Rocky Mountains; the air is again forced upwards, and on coming to the altitude of the summit of the coast range rain is again precipitated, and continues to fall as long as the air ascends, that is, until it has passed over the summit. This explains why there is more rain on the western than on the eastern sides of the coast and Selkirk ranges. Still proceeding eastwards, the wind passes the summit of the Rocky Mountains, the air descends into the plains of the north-west territories, and is heated by the compression due to greater atmospheric pressure; but having previously absorbed the latent heat given up by the moisture which fell as rain on the coast range and the Selkirks, it is now at a much higher temperature than it was when at the same altitude on the western side of the mountains; it is also much above dew-point.

This is the explanation of the dry climate of the western plains and of the paradoxical chinook winds, which appear as if warmed by passing over numberless fields of snow and ice. It will thus be seen that no reasonable expectations can be entertained that the climate of the Selkirk region will materially improve.

Triangulation in the Argentine Republic.—The *Boletin del Instituto Geografico Argentino*, tome xiv. 1893, states that the Committee appointed in May 1891, for the Triangulation of the Argentine Republic, have decided to cover the country with a net of triangles of the first order, each about 27 miles in the side, and with triangles of the second order ranging from 7 to 10 miles in the side. On account of the difficulties of triangulation in the plains, upon which Ligault towers 100 feet high must be established in order to be visible at distances of about 27 miles, the Committee have decided to determine the position of the apices of the triangles in the first-class net by means of astronomical observations for latitude and telegraphic determinations of longitude, according to the method of Horrebron, usually attributed by North Americans to Captain Talcoth. Experience has proved that longitude may be determined by this method with errors never exceeding one-sixth of a second, which would correspond to an error of 12 feet on the ground, while the possible error of latitude is 0″·1; that is, about 10 feet. The maximum error in the length of any triangle's side would thus not be over 22 feet. The Sub-Committee to supervise the work is composed of Sr. Francisco Beuf, Director of the La Plata Observatory; Carlos Maschwitz and Francisco Segui, engineers; Dr. Francisco P. Moreno; Captain Guillermo J. Nunez, of the Argentine Navy; and Sr. Abel Draz, secretary.

Patagonia.—Captain Hugo Capalowicz, of Vienna, in finishing his voyage round the world, visited Patagonia, and after ascending the Rio Negro to its upper course (Rio Limay), devoted himself specially to the study of the pampas grasses and to a thorough examination of the Nahuel Huapi and the neighbouring lakes on its northern side, and the geological conditions of the district. Specially worthy of note is the fact that Capalowicz could find nowhere any traces of a glacial period having affected the region. All those phenomena which Siemiradzki (*Geog. Jour.*, Vol. II. p. 158) not long before had noted in the same region as glacial, Capalowicz ascribes to fluvial causes. A detailed exposition of his investigations will shortly appear in the Memoirs of the Vienna Imperial Academy, with the title "The Rio Negro Region of Patagonia," together with a geological map of the North-West Limay Region. The orography of this map is based upon measurements taken by the explorer himself, and the map should, to a great extent, supplement Siemiradzki's map (*Petermanns Mitteilungen*, 1893, iii.), of the same region. The Nahuel Huapi appears on this map in almost the same shape as before, with the narrow island, about 12¼ miles long, in the middle, from which the lake takes its name of Nahuel Huapi or Tiger Island But, as Siemiradzki has already rightly guessed, the lake is considerably smaller—above all, shorter—than was supposed; it measures about 40 miles from north-west to south-east; its altitude above sea-level is very much greater than was concluded from the last (Rohde's) measurement; namely, 3170 instead of 2030 feet.

AUSTRALASIA.

Damma Islands, Banda Sea.—In November, 1891, a visit was paid by P. W. Bassett-Smith, Surgeon, R.N., to the small island of Damma, lying in the Banda Sea, between Timor and the Tenimber group (*Journal Anthrop. Inst.*, xxiii., No. 2). Though nominally under Dutch rule, the only official was found to be an old Malay from Macassar, who had the office of "Post-holder." The island lies on

the route from Port Darwin to Hong-Kong, and is occasionally visited by trading-ships; but little is generally known of it or its inhabitants, who, placed on the border-line between the Malayan and Papuan races, cannot be hastily classed with one or the other of these. The island, which is of a rough, horse-shoe form, is mountainous, and shows signs of volcanic activity in a constantly-smoking truncated peak at the northern end, and in layers of lava, patches of sulphur, and hot streams and springs on the eastern side. The profuse vegetation of the island recalls that of the Moluccas. A landing was effected in a natural harbour on the east side, fringed with coral reefs. A large village at the head of this bay was visited, and another on the hill-side was reached during an excursion which led through thick forest. Both villages agreed in being surrounded by a wall. In the vicinity were plantations of coco-nut, betel-nut, and bread-fruit trees, plantains, etc., and at the lower village, of sago, which is extensively washed in machines, like those described by Wallace. The huts were of bamboo, not on piles, with walls of laths, and gable roofs of thatch. Species of *Acacia* and *Ficus* were met with in great numbers; and of birds, swifts, lories, the great fruit-pigeon, etc. As far as could be judged, two types existed among the natives. The first, dark brown, with coarse straight hair, dilated nostrils, and large mouths, seemed to occur chiefly in the coast villages and to be of Malayan origin, though perhaps with some mixture. The other, which was observed in the hill-villages, was a coppery-brown—much lighter race—with frizzly hair, aquiline and slightly hooked nose, and of a much brighter disposition. These seemed, in spite of their light colour, to be more akin to the Papuans. Bows and arrows of bamboo, the latter 5 feet 6 inches long, are the principal weapons; while ingeniously made combs, ear-pendants, and bracelets of wood or bone, formed the chief ornaments. Boat-building is practised—the boats being "dug-outs," with large outriggers, and often a high and pointed bow and stern. Wooden "gods" were seen near the villages, and were held in fear. The beating of a drum by the chief man of the village at sunrise and sunset was no doubt a religious rite. The "gods" as well as their carvings, ornaments, etc., were decidedly Papuan in type, and on the whole the majority of the people (who in some ways much resemble those of Tenimber), approach the Melanesian, rather than the Malay, race.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Temperature and Conductivity of Snow.—Volume xvi. of the *Repertorium für Meteorologie* contains an account of some important observations by Dr. H. Abels on the temperature, conditions, and thermal properties of snow. The object of the investigation was to find a relation between the thermal conductivity of snow and its density, the density being defined as the ratio between a given volume of snow and the volume of water obtained from it by melting. It was found from observations at Katharinenburg in 1891 and 1892 that the density of firm snow ranged from $\frac{1}{3}$ to $\frac{1}{3\cdot7}$, and of loose snow from $\frac{1}{3\cdot6}$ to $\frac{1}{7}$, the variation with depth being small to at least 4½ inches below the surface. The data for calculating conductivity were obtained from hourly observations of temperature at the surface and at 2 and 4 inches below it. These showed a rapid decrease of amplitude in the daily variation of temperature with increase of depth, the decrease being faster in loose than in firm snow. The daily minimum rises much more rapidly than the maximum falls; the minimum observed at 4 inches was as much as 20° Fahr. higher than at the surface, while the maximum at that depth was only 7°·5 lower. The temperature in both loose and compact snow showed greatest uniformity at 4 P.M., the greatest difference amounting to 4°·3. In the case of denser snow the diurnal curve of temperature showed a regular retardation in both maximum and minimum,

the former phase being one hour later at a depth of 2 inches than at the surface, and the latter an hour and a half later. Loose snow, on the other hand, showed comparatively little alteration in the first 2 inches, but the retardation was markedly greater at greater depths. The author suggests that this peculiarity is due to the transparency of the loose surface layers to the sun's rays, whereby a certain amount of heat is received which is disposed of by construction and not by radiation, the process being similar to what occurs in a forcing frame. Further explanation is thus afforded of the great protective action of a snow-covering, and an additional reason advanced for the higher temperatures observed in loose snow than in dense. Assuming the specific heat of snow to be the same as that of ice, and employing the temperature observations in the usual way, Dr. Abels computes the thermal conductivity of snow, and finds it proportional to the square of the density as above defined. From the numerical values it would appear that snow of average density, say $\frac{1}{5}$, offers about four times greater resistance to external changes of temperature than does one of ice of equal thickness, and that independently of its peculiar property of retaining radiant heat. This affords a measure of the protective power of a snow covering to the surface on which it rests. Considerable additional light on the general question of the influence of snow-covered areas on climate may be gained from a paper by Eduard Brückner in the *Zeitschrift des Deutschen und Oesterreichischen Alpvereins*. Following closely the lines of Dr. Woeikof's papers on this subject, temperature observations made at Danos are discussed in great detail, and the author finds that there the surface of the snow is usually colder than the air, except when snow is actually falling, the difference being greatest when the sky is least obscured by cloud. Hence the snow-covering exerts a strong cooling influence on the air, especially in calm anticyclonic weather, and under such conditions there is frequent condensation of vapour from the air on the snow-surface, in the form of "silver-thaw." These results may be taken as qualitative, and the author concludes the paper with an attempt to estimate quantitatively the variations of climate due to the presence or absence of snow in the Bavarian Alps.

The Daily Afternoon Minimum of Wind-force.—The Vienna Academy of Sciences has received from Professor Pernter, of Innsbruck, a paper entitled "An explanation of the daily oscillations in the velocity of wind." The author holds the view that the diminution of the speed of the wind on mountains at midday, and its increase during the night are due to the mixing of the upper strata of air with the lower, which, as is well known, causes an increase of the internal friction, thus retarding the movement of the masses of air. According to Köppen these convection currents are sufficient cause for the daily oscillations of the strength of the wind on the surface of the Earth; but there are no facts known which would justify the assumption that such currents attain to an altitude of 10,000 feet. Thus, although Pernter considers that the afternoon minimum registered from the observatory of the Eiffel Tower is explained by the retarding action of the mixing together of currents of air moving one above another, he ascribes the same minimum on the summits of high mountains to the local ascent up the mountain sides of valley winds. That is to say, he considers this phenomenon as resulting from special climatic causes rather than from general meteorological ones.

GENERAL.

Speed of Travelling in the Future.—In an article published in the *Bulletin* of the Antwerp Geographical Society (vol. xviii. p. 47), E. de Keyser discusses the future of rail and steamship travelling and of the speeds which may be attained in the next century. Having glanced at the first beginnings of ocean navigation,

the writer reviews the methods of travel in use so late as the end of last century, when the journey from Brussels to Paris by diligence occupied three to four days, the greatest improvements up to the introduction of railways hardly reducing that from Paris to London to two days. M. de Keyser then traces the progress made since the introduction of steam down to the present day, when the mean speeds maintained for long distances (including stops) on the great trunk lines average about 31 miles (50 kilometres) an hour, while experiments made for short distances have given three times this speed. The course of trans-Atlantic navigation down to 1892, when the record for the passage (made by the *Paris*) stood at five days fourteen hours, or 20·7 knots an hour, is also sketched, and the principal routes at present existing are described. By combining in the most advantageous way the actual runnings on the different lines which together complete the circuit of the globe, the writer shows that this may be made viâ San Francisco and New York in sixty-seven days (including a day's delay at the latter, and three more than necessary between Hong-Kong and Yokohama), while by the Canadian Pacific and New York, under a favourable conjunction of circumstances, such as occurred *e.g.* in August, 1891, the time here allowed from Yokohama to London may be reduced by six days. The quickest circuit will be made when the greatest proportion is by land; therefore when the Siberian railway is completed—and judging from the progress already made on different sections, another ten years should see Vladivostok in direct communication with Europe, by the help (provisionally) of steamers on Lake Baikal and the Amur—the time may be still further reduced. At the present rate of travel on existing lines, allowing a very moderate rate across Siberia, and supposing a connection established between Vladivostok and Yokohama by Japanese steamers and railways, it is found that the duration of the tour is reduced to fifty days, or forty-five when the whole Siberian railway is completed, and thirty-seven if European speeds were extended to it. In discussing the speeds attainable in the future, the writer, while allowing that with the steam-engine a safe limit must soon be reached, holds that by the help of electricity, the rate by rail may be increased almost indefinitely. With steamships the case is different, owing to the enormous supplies of fuel necessary for a greatly increased speed, and the limitation of draught, and with it of coal-carrying capacity, involved by the necessity of entering ports. With the electric railways of the future, with a speed double the present average for long distances, M. de Keyser sees it quite possible to perform the tour of the world in twenty-four days.

Cycling and Local Geography.—Mr. W. T. Arnold forwards us a paper on bicycling which he contributed to the *Manchester Guardian*. It contains an interesting instance of a cycling lesson in local geography, the particular exercise described being a run along the valley of the Medlock from a point as near the source of the main tributary as could be reached on wheels to the junction of the river with the Irwell. We can heartily commend this system of studying local geography; for although it necessarily limits the track of the traveller to made roads, or at least footpaths, the importance of changes of gradient and level is much more readily realised awheel than afoot, and the cyclist's eye—already trained to observe the features of the way which affect his locomotion—can readily accommodate itself to the nobler exercise of seizing the salient aspects of the scenery, and gaining first-hand geographical knowledge on a small scale. For a school-teacher such a relaxation should prove invaluable, and would unquestionably lead to a more vital grasp of the greater watersheds and valleys of the continents that are so frequently handled as mere statistical abstractions. Mr. Arnold very truly says, in urging the importance of his plan:—"Abroad the teaching of geography always

begins with the district in which the children live. If Manchester were in Switzerland or Germany there would be large-scale maps of the district in all the elementary schools, showing its relation to the Pennine on the one hand and the sea on the other, and, above all, representing its river system with the greatest possible clearness. Manchester is where it is because the Irwell and the Mersey are where they are, and it is to the streams descending from the Pennine that the establishment of the cotton manufacture in Lancashire was originally due. But who knows the river system of South Lancashire—the course and origin of the Tame, the Medlock, and the Irk, for instance? Even the Mersey (Goyt and Etherow) and the Irwell are far less clearly apprehended than they should be. There is no good local map, and even on the Ordnance sheets it is by no means easy to trace the streams, so hidden and disguised they have been by man. The books are equally wanting, J. R. Green alone in his 'Geography' giving a few helpful hints." The same is true of most districts of the United Kingdom. Local ignorance of existing means of information is remarkable, and in the course of University Extension lectures in different parts of England and Scotland the explanation of the Ordnance maps of the district, coloured to bring out the contour-lines and drainage-lines more clearly, has been found to be more of a revelation ingeography than a lecture on the configuration of distant continents.

Geography and the Army Entrance Examinations.—Mr. W. Baptiste Scoones, in a recent number of *The Nineteenth Century*, speaks plainly and strongly on the subject of the selection of Army Officers by competitive examination. He recognises the great importance of Geography as a subject of examination for British officers, and in deploring the manner in which this science has been neglected, he makes the following remarks:—"The old preliminary examination in this subject unmasked a state of ignorance that was appalling. Its inconvenience as part of any established curriculum of study appears to be such that it has now been considered expedient to relegate it to the *optional* subjects, with marks sufficiently immaterial to discourage candidates from bothering their heads much about it. In the interests of our officers of the future this is scandalous. To no other subject is greater attention paid in examinations for officers of the French or German army. In France it is placed on exactly the same marks-level as history, and only a trifle below mathematics; while in regard to a modern language it stands as fourteen to ten. And, as with history, the same care is taken in their regulations to define the necessary course of study. Different countries and different subdivisions of the globe have to be considered under the several heads of, Physical Geography, Orography, Hydrography, Political Geography, and Railroads; and in the case of the rivers that are specified, the strategic importance of the regions they traverse has to be studied."—"When it is remembered that twenty-three years ago English correspondents at the Franco-German War reported that every German commissioned and non-commissioned officer carried a map of France in his wallet and was quite at home in the topography of the invaded districts, it is high time to call to account those who have encouraged this blameworthy supineness of ours. Assuredly, then, Lord Sandhurst's Committee will have to include Geography among the compulsory subjects, and assign to it the same prominence as History. Thus far it seems to have been kept outside the pale of 'education,' and has been treated as a subject *pour rire*. At school it has never occupied a position even approximating to that which at the Universities certain personages call 'stinks'; and yet it would be difficult to mention any subject more likely to be of general utility to a soldier, provided the present humdrum, childish smattering could be made to blossom, as it

must do, into a minute and interesting appreciation of all its political, physical, and scientific aspects."

The late August Artaria.—The death is announced from Vienna, on December 14th, 1893, of August Artaria at the age of eighty-seven. Head of the map-publishing firm of Artaria & Co. since 1842, the deceased maintained the high reputation of the oldest business of the kind in Austria. It was founded in 1770 Scientific geography is chiefly indebted to him for the publication of the cartographical work of such scientific geographers as Auton Steinhauser (*ob.* 1890) and General Ritter von Hauslab, with whom he was always on the most intimate terms. To his co-operation with the most distinguished scientific workers of his time are due his admirable maps of the Alps, of Central and South-Eastern Europe, and of Austria-Hungary. The fact that in these maps Hauslab's method of colouring—amount of elevation corresponding to depth of tint—was carried to its fullest extent, places August Artaria at once among those who bore the burden and risk of introducing and proving the real scientific value of the newer methods of cartography.

Globus and Ausland.—In 1828 a weekly geographical journal was started in Augsburg, under the name of *Das Ausland Ueberschau der neuesten Forschungen auf dem Gebiete der Natur-, Erd-, und Völkeskunde*, thus being one of the earliest journals devoted exclusively to geography, the only one of prior date being the *Bulletin* of the Paris Geographical Society, which commenced in 1824. The place of publication was changed to Stuttgart in 1873, by the publishers, Messrs. Cotta; in 1882, the sub-title was changed to *Wochenschrift für Ländes- und Völkeskunde*, and Professor Friedrich Ratzel's name appeared upon the title-page. Subsequently Dr. Karl von Steinen, and finally Dr. Siegmund Günther acted as editors; and, with the close of 1893, the publishers brought the journal to an end, nominally amalgamating it with *Globus*, which, published at Brunswick, has appeared since 1862, two volumes being issued each year. It is matter of speculation as to whether the growth of the numerous colonial journals now appearing in Germany has made it impossible for a scientific paper like *Ausland* to pay its way, or whether the lack of popular support which presumably led to the collapse of the journal arose from deeper causes. *Globus* has been distinguished for its excellent illustrations, and this feature is fully maintained in the earlier numbers for 1894, in which we also notice with pleasure that the publishers have abandoned the old German character and introduced Roman type.

Olaus Magnus and his Map of Northern Europe.—An article by H. A. Schumacher appears in the *Zeitschrift* of the Berlin Geographical Society (1893, No. 3), giving an account of the old Swedish Geographer Olaus Magnus and the part which he took in promoting a knowledge of the northern parts of Europe. He spent some time in travel and study at continental seats of learning, and at the instance of Ascimboldo, Papal Legate in Sweden, proceeded on a mission through the northern parts of Scandinavia, thus becoming personally acquainted with some of the countries on which he afterwards shed so much new light. On the succession of Gustavus Vasa, Olaus Magnus accompanied his brother, an exiled ecclesiastic, to Danzig, where they devoted themselves to literary pursuits, the elder working at the history, the younger at the geography, of the north. He made a journey to Rome in 1533, and in 1537 finally left Danzig and resided in Venice, where he made the acquaintance of Ramusio, and here in 1539 his great map was published accompanied by a descriptive index. The details of this are fully described by Schumacher, the characteristic feature being the amount of information respecting the northern

groups of islands and their productions, besides Iceland and Greenland. The latter years of Olaus' life were spent in Rome, where he completed a voluminous 'History of the Northern Nations,' in which the most varied matter is thrown together without much arrangement. The map of Olaus differed from its contemporaries in showing the separation of Norway from Greenland by the Ocean, and thus supported the views of those who held that it was possible to sail to China by following the north east. After the death of its author, the map soon fell into oblivion, and later copies omitted much of its detail. From many points of resemblance between it and the map attributed to the Zeni, the writer holds that this was really of later date, and principally taken from that of Olaus Magnus.

CORRESPONDENCE.

The Determination of Longitudes by Photography.

December 18th, 1893.

I have with much interest read Mr. Ravenstein's remarks on my paper about the determination of geographical longitudes by photography (*Journal*, November 1893). The following notes may, I think, throw some further light on this important subject:—

Mr. Ravenstein is of opinion that we have scarcely as yet got beyond the experimental stage in the determination of longitudes by photographic lunars, and that not a single determination of that nature has been made in the field. But in reply to that I may say that more than a year ago, at the meeting of the British Association at Edinburgh, I gave the results of a complete computation of a longitude, taken with strict observance of all conditions in the field. In *Nature* (August 25th, 1892), and in *Petermanns Mitteilungen* (vol. xxxix., 1893, p. 88) reports are to be found on these results, proving that I introduced the new method in a complete form to the scientific world. The sole reason why my paper in the November number of the *Journal* contains no computations is in deference to the wish of the Editor to have the subject-matter of the paper brought before the Fellows of our Society in such a form as to be intelligible to everybody without entering into mathematical details. The necessary computations have been published in the *Verhandlungen des X. Deutschen Geographentages*, Berlin, 1893.

I am not aware that any leading authority has condemned *in toto* the sextant for astronomical work on *terra firma*. I for my part—although I do not claim to be an authority in this respect—have never entertained such a thought. In my opinion a *good* sextant is of the utmost value for all observations in connection with local time and geographical latitude, on sea as well as on land. But the case is totally different with lunar observations. Sir Isaac Newton computed that the average velocity of the proper motion of the moon in one second of time amounts to the very small angle of 0·5479 second of arc. Moreover, errors in the time of the observation of a certain lunar distance produce, as is well known, serious errors of longitude. Under these circumstances it is evident that strict accuracy cannot be looked for from single sets of lunar observations measured with the sextant or other reflecting instruments.

Mr. Ravenstein says that the apparatus which I have invented is in fact nothing but a "photogrammeter." The novel and principal features in the

construction of my apparatus are that the images of moon and star can be made equidistant from the centre of the plate, and that at the same time the observations can be repeated with the utmost rapidity, enabling the observer to take as many sets of lunars as he likes without loss of time or waste of photographic plates. It is evident that the minute accuracy, as well as the practical value of the method, depend on these peculiar arrangements, which are fully described in my paper, and which differ entirely from any "photogrammeter." I may be permitted to add that many experiments, as well as months of labour, were required before I was satisfied with the construction of the apparatus, both as to accuracy and simplicity.

With regard to the preference which Mr. Ravenstein gives to some other kinds of observations, I shall always be very glad to see longitudes accurately determined by these or any other of the old-established methods; but up to the present time strictly accurate results are rare. One of the main reasons why I worked out this new method is the indisputable fact that only a very small number of accurately determined geographical longitudes in the interior of unsurveyed countries exists. It is, however, well known that approximate determinations are numerous; but their mathematical limits of accuracy are very doubtful. Probably Mr. Ravenstein refers to such approximations, when he says in his letter that of recent years quite a number of longitudes have been satisfactorily determined in Africa.

Let the theodolite, the sextant, and the photographic apparatus compete in the accurate determination of longitude, latitude, and local time, and the "survival of the fittest" will soon become evident.

HENRY G. SCHLICHTER.

P.S.—I take this opportunity to correct a printer's error in the table which forms part of my paper (*Journal*, November, 1893). The fourth lunar distance between Spica and the moon should, of course, read 20·672mm., instead of 30·672mm.—H. G. S.

The Sea Route to Siberia.

December 21st, 1893.

I have read with much interest the notes recorded by Mr. Ernest C. F. James, who accompanied the small fleet of vessels that took the consignment of rails to Golchika this year, piloted by Captain Wiggins. I should like to add a few remarks which I think might be useful to anyone who is anticipating making a trade route of the water-way to Siberia. Doubtless the reader will remember that in the year 1890 the Anglo-Siberian Trading Syndicate sent out two vessels (organised under the inspiriting influence of the late Sir Robert Morier), the s.s. *Biscaya* and the s.s. *Thule*, the former a Norwegian vessel of 700 tons register, and the latter of 400 tons. The s.s. *Biscaya* carried Mr. Oliver Williams and myself as representatives of the Syndicate, a mining expert, Mr. William A. Mercer, A.M.I.C.E., as well as Mr. Julius M. Price, F.R.G.S., a special correspondent from the *Illustrated London News*.

The *Biscaya*, under the command of Captain Petterson and Captain Crowther, as ice-master, reached the Yugor Straits on August 4th, and Golchika August 13th, and, not meeting the s.s. *Phœnix* with the Company's agent on board, proceeded up the Yenisei, piloted by the little English steam launch *Donna-Anna*, in charge of Mr. W. A. Mercer, to Karul, a distance, as before stated, of 200 miles beyond

Golchika, without any accident or difficulty, where we met the river flotilla. This was the first, and I believe so far the only steamer drawing 18 feet of water that has penetrated the estuary and reached the sheltered bay of Karul, where cargoes can be transshipped without any risk whatever. The s.s. *Thule*, with the tug-boat *Bard* in tow, and commanded by Captain Cordiner (the *Bard* being in charge of the brother of Captain Wiggins), arrived safely a week later, bringing Mr. W. H. Tagart, one of the Directors. After transshipping cargoes to the river steamer *Phœnix* and various barges, the *Biscaya* and the *Thule* returned to England with Siberian produce, while the *Phœnix* and the small tug *Bard* proceeded to Yeniseisk, arriving there safely on October 25th.

According to Mr. James very little difficulty was met with in the Kara Sea as regards the ice. We, on the contrary, experienced great trouble, owing probably to the fact of our being somewhat in advance of the season, and were ice-bound for three days. Once however through the ice-belt, we experienced no further trouble. It is evident that an uninterrupted passage is by no means a certainty, and to provide for any emergency vessels destined for this route should be stout wooden vessels suitably strengthened for ice-ramming; for it is of great importance to be able to force aside the detached floes, thus frequently opening a free passage.

The experience of 1893, as well as of past years, seems to me to prove that Golchika is unsuited for the port of transfer owing to its being an open roadstead, exposed to sudden storms. We clearly demonstrated that ocean steamers, drawing upwards of 18 feet, can safely be piloted by steam launch as far as Karul, where, as before observed, there are natural facilities for discharging cargoes.

J. Goldsmith Procter.

OBITUARY.

Sir Samuel White Baker.

By E. G. Ravenstein.

It is with regret we place on record the death of Sir Samuel White Baker, which took place on December 30th at the deceased's country residence, Sandford Orleigh, near Newton Abbot. Baker was born at Thorngrove, near Worcester, on June 8th, 1821. He received an excellent education, and, when still a young man, in 1845 he joined a brother at Nuwara Eliya in Ceylon. The farming operations in which they engaged did not prove a success, but an eight years' residence in Ceylon afforded Baker an opportunity of gaining experience and even renown as a sportsman.* After his return to Europe he was engaged for some time upon the railway which now connects Ruschuk with Varna. This occupation, however, could afford no satisfaction to a man of Baker's adventurous spirit and love of sport. Ample private means enabled him to follow his inclinations. His friends Speke and Grant had left Bagomoyo in October 1860 in search of the true source of the Nile. Baker determined to meet them. His young wife, a lady from Pest, insisted upon sharing all dangers and hardships. On April 15th, 1861, Baker left Cairo. He was able to travel leisurely, for Speke and Grant were not expected on the Upper

* 'The Rifle and the Hound in Ceylon.' London, 1854. 'Eight Years' Wanderings in Ceylon.' London, 1855.

SIR SAMUEL W. BAKER.

(*From a Photograph by Maull & Fox, May*, 1866.)

Nile before the beginning of 1863. On reaching Berber he turned aside, and spent a full year in the region watered by the Atbara, Setit, and other Nile tributaries of Northern Abyssinia. He had thus an opportunity not only of satisfying his love of sport and adding to some extent to our geographical knowledge, but also of acquiring a knowledge of Arabic and of native character which proved of the utmost service to him during his subsequent career.*

On June 11th, 1862, Baker reached Khartum, where he waited until December for the northerly winds, which enabled him to reach Gondokoro on February 2nd, 1863. Speke and Grant arrived there a fortnight afterwards, whilst Petherick, who had left Khartum in March, only reached Gondokoro on February 20th. He had, however, placed boats and stores at Gondokoro for the use of the expected travellers.†

Speke had indeed discovered the Victoria Nyanza to be the true source of the Nile, but he had been unable to visit a lake to the westward which the Nile was stated to cross on its way to Gondokoro. Baker at once determined to clear up this interesting geographical question. His own men were in a state of mutiny, whilst the slave-traders openly defied him to penetrate into the interior. Nevertheless, he started on March 26th, and his courage and resolution enabled him to overcome obstacles to which most other men would have succumbed. His wife stood nobly by him during all these trying times, and a full share of the success of the expedition must be awarded to her. Having spent some time in the Latuka country, Baker crossed the Nile at Karuma, visited Kamrasi, the king of Unyoro, at Mruli, and on March 14th, 1864, he looked down upon the lake he was in search of, and bestowed upon it the name of Albert Nyanza.

Baker, deceived perhaps by the condition of the atmosphere, and misled by native reports, conceived this lake to extend far to the south, possibly as far as the Tanganyika. For thirteen days he followed its eastern shore, as far as the mouth of the Victoria or Somerset Nile. Whilst ascending that river he discovered the Murchison Falls. In March 1865 he was back at Gondokoro. He then hastened home, and met with a most enthusiastic reception. The Royal Geographical Society, in recognition of his important discoveries and trustworthy astronomical observations, had already awarded him its Patron's Medal, the Paris Society voted him a similar distinction, the Royal Society elected him one of its Fellows, and the Queen conferred upon him the honour of knighthood.‡

During this remarkable expedition Baker had become an eye-witness to the horrors of the slave-trade, and he resolved to offer his services for its suppression. He proposed to the Khedive to annex the whole of the region of the Upper Nile, as far as the lakes; to establish there a strong paternal government, to take measures for the development of the great natural resources of those countries, and to open them to legitimate trade. The Khedive favourably entertained these propositions; he conferred upon Baker the rank of pasha and large powers, but owing to the ill-will of all the Egyptian authorities, and especially of those in the Sudan, Baker never had a fair chance of accomplishing the difficult task which he had undertaken. He left Khartum in February, 1870, with a small flotilla of two steamers and thirty-one sailing vessels, but of the 800 soldiers who accompanied him about one-half were discharged convicts. The expedition met with obstacles from its

* 'The Nile Tributaries of Abyssinia and the Sword Hunters of the Hamran Arabs.' London, 1867. See also *Journal* R.G.S., Vol. XXXIII., 1864, pp. 237–41; and *Proceedings*, Vol. X., 1866, pp. 279–95.

† For Petherick's own account of this "failure" of bringing succour to Speke and Grant, see 'Travels in Central Africa,' by Mr. and Mrs. Petherick. London, 1869.

‡ 'The Albert Nyanza.' London, 1866. See also *Journal* R.G.S., 1866, pp. 1–18.

very outset. The Nile, above the Sobat mouth, had become choked with matted vegetation, such as had probably deterred Nero's centurions from proceeding any further. Baker, however, was not to be deterred. He determined to make his way to the upper reaches by way of the Bahr Zaraf. The task proved more formidable than he had expected, and it was April 15th, 1871, before he arrived at Gondokoro. Two years were spent in fighting slave-dealers and native tribes, the retreat from Mazindi forming perhaps the most stirring episode in this warfare. When Baker left Gondokoro in April, 1873, peace had been established in the region to the south of Gondokoro, and the slave-traders had been compelled to retire. New geographical discoveries had not been made, but Lady Baker had carefully kept a meteorological journal, whilst Lieutenant Julian Baker had largely improved the map of these regions.*

Baker never again returned to savage Africa, being content to seek sport in Cyprus † and other more accessible countries of the world, continuously enriching his home in Devonshire with trophies of the chase. He retained, however, a deep interest in the future of Africa. No one deplored more than he did the evacuation of the Sudan, for he looked upon the whole basin of the Nile as a natural and necessary appendage of Egypt, and ever urged the present rulers of that country to adopt a determined and continuous policy with respect to the Sudan. ‡

Baker's name will for ever be associated with the solution of the great problem of the Nile sources, which has occupied the geographical world since the days of Herodotus. There have been African explorers who covered more ground, or who, favoured by circumstances, have been able to bring home a greater mass of scientific information; but none whose labours were dictated by nobler motives: none who in the pursuit of their work were called upon to exhibit greater courage, circumspection, and resoluteness. Lady Baker shared in all the hardships and perils of her husband; she stood fearlessly by his side at critical moments, and may fairly share in the honour that has been won.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1893–94.

Fourth Ordinary Meeting, January 15th, 1894.—Sir JOHN KIRK, K.C.B., G.C.M.G., &c., Vice-President, in the Chair.

ELECTIONS.—*William Lindsay Alexander; James Victor Burn-Murdoch; Ronald Stanley Clarke; I. Irvine; Edmund George Lamb, M.A.; Hon. G. W. Spencer Lyttelton; William John May; Dr. Hamilton Seymour; Cecil William Paulet Slade; Arthur Smith Wood.*

The Paper read was:—

"An Expedition to the Glaciers of Mount Kenia." By Dr. J. W. Gregory.

There was an exhibition of photographs in the tea-room.

* 'Ismailia.' London, 1874. See also *Journal* R.G.S., 1874, pp. 131–48.

† 'Cyprus as I saw it in 1879.' London, 1879.

‡ See, for instance, "The Soudan and its Future," *Contemporary Review*, January, 1884; "Khartum and the Soudan," in F. T. James's 'Wild Tribes of the Soudan'; and letters in the *Times* of December 18th, 1883, December 8th, 1884, and May 31st, 1890.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, &c., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps and Jura. **Brückner.**

Ueber die augebliche Aenderung der Entfernung zwischen Jura und Alpen. Von Professor Dr. Ed. Brückner. Separatabdruck aus dem XI. Jahresbericht der Geographischen Gesellschaft von Bern für die Jahre 1891–1892. Size 9 × 6½, pp. 9.

Alpine History. **Edgcumbe.**

A Missing Page in Alpine History. By Richard Edgcumbe. [From *The National Review*, October, 1893, pp. 249–257.]

Finland. **Rees.**

A Fortnight in Finland. By J. D. Rees, C.I.E. [From *The National Review*, October 1893, pp. 215–229.]

France—Caverns. **Martel and Gaupillat.**

Annuaire Club Alpin Français **19** (1892): 201–235.

Sous Terre: cinquième campagne. (Vaucluse et Basses-Alpes; Ardèche; Gard; Lozère; Aveyron; Tarn-et-Garonne; Lot; Charente; Puy-de-Dôme; Côte d'Or). Par MM. E. A. Martel et G. Gaupillat.

These records of underground mountaineering are as full of interest as ever, and are illustrated by diagrams of some of the very uncomfortable places which the adventurous explorers succeeded in reaching and returning from.

Holland. *Tijdschrift Nederlandsch Aardrijk. Genootschap* **9** (1892): 301–318. **Tonkes.**

Over den Regenval in Nederland door Dr. H. Tonkes.

An essay on the distribution of rainfall over Holland; illustrated by six maps.

Iceland. **Thoroddsen.**

Geologiska Iagttagelser paa Snæfellsnes og i Omegnen af Faxebugten i Island af Th. Thoroddsen. Med et geologisk Kaart. Stockholm, 1891: size 9 × 6, pp. 97.

This paper on the geology of the Faxa and Reide fjords in Iceland appears in the *Proceedings of the Royal Swedish Academy of Sciences*, vol. xvii., part 2.

Manchester Ship Canal. **Egerton.**

The Manchester Ship Canal. By the Right Hon. Lord Egerton of Tatton. [From *The Nineteenth Century*, January 1894, pp. 12–22.]

Norway—Gullmarfjord. **Palmqvist.**

Hydrografiska Undersökningar i Gullmarfjorden Sommaren 1890 af A. Palmqvist. Med 3 Taflor. Stockholm, 1891: size 9 × 6, pp. 19.

Particulars of temperature and other observations in the Gullmarfjord. Published in the *Proceedings of the Royal Swedish Academy of Sciences*, vol. xvii., part 2.

Pyrenees. *Annuaire Club Alpin Français* **19** (1892): 432–456. **Schrader and Margerie.**

Aperçu de la forme et relief des Pyrénées. Par MM. F. Schrader et Emm. de Margerie. *Map in colours.*

Another copy. *Presented by the Authors.*

This admirable summary of the orographical structure of the Pyrenees will be specially noticed.

Russia—Archæology. ——

Congrès International d'Archéologie et d'Anthropologie Préhistoriques. Deuxième Session, à Moscou, août 1892. 2 vols. Moscow, 1893.

The two volumes, of which the second is just out, contain, besides some important papers contributed by West European anthropologists, a number of papers and notes relative to the stone, bronze, and iron-ages, inhabitants of the territory of the Russian Empire, as well as to the craniometry of several of its present inhabitants.

Russia—Industries. **Crawford.**

The Industries of Russia. Vols. I. and II. Manufactures and Trade, with a general Industrial Map by the Department of Trade and Manufactures, Ministry of Finance for the World's Columbian Exposition at Chicago. Editor of the English translation, John Martin Crawford, U.S. Consul-General to Russia. St. Petersburg, 1893: size 10½ × 7, pp. xv., liv. and 576.

Vol. V. Siberia and the Great Siberian Railway; with a general Map by the Department of Trade, &c. St. Petersburg, 1893: size 10½ × 7, pp. xii. and 265. *Presented by M. V. I. Kovalevsky.*

Russia—Novgorod Province. **Peredolsky.**

V. S. Peredolsky. Remains of the Stone-Age Inhabitants of the Shores of Lake Sloneñ, the Banks of the Volkhov, and the Territory of Novgorod Velikiy. St. Petersburg, 1893.

The book is based on a very rich collection of stone-age implements discovered during excavations made by the author at Novgorod and Kolomtsy. The conclusion of the author is, that the inhabitants of the shores of Lake Sloneñ have stayed there since the Glacial Period, down to the times of the first Russian annals. The locality would thus represent the stone-age cradle of the North Russians.

Russia—Perm. **Smishlyaer.**

The Perm Region (*Permskiy Krai*). A collection of information on the Government of Perm, published by the local Statistical Committee. Edited by D. Smishlyaer. Two volumes. Perm, 1892–93. [In Russian.]

The first volume is entirely devoted to information on agriculture. The second contains valuable ethnographical and archæological articles—viz., M. Teploukhov's researches into the "Chud" antiquities; a copy of the map of the province of Ekaterinburg and Solikamsk, compiled in 1734–1736, with a descriptive text; historical information upon the possessions of the Stroganovs (to whom the Ural mines and forests had been given by the Crown); on the insects destructive to corn-crops; and on popular medicine, &c.

Spain—Elché. *Annuaire Club Alpin Français* **19** (1892): 278–298. **Riston.**

Une oasis saharienne en Espagne: la forêt de palmiers d'Elché. Par M. Victor Riston.

Switzerland. **Steck and Zeller.**

Arbeiten aus dem Geographischen Institut der Universität Bern. Th. Steck: Die Wassermassen des Thunevund des Brienzersees. Th. Steck: Die Denudation im Kandergebiet. R. Zeller: Die Schneegrenze im Triftgebiet. Seperatabdruck aus dem XI. Jahresbericht der Geographischen Gesellschaft von Bern für die Jahre 1891–1892. Bern, 1893: size 9 × 6½, pp. 40.

ASIA.

Ararat. *Annales G.* **3** (1893–94): 81–94. **Chantre.**

L'Ararat. Par E. Chantre.

After a brief recapitulation of the early climbers of Ararat, M. Chantre gives an account of his observations while camped at the base of the mountain in 1890.

Asia-Minor. *R.G.S. Supplementary Papers* **3** (1893): 639–739. **Hogarth and Munro.**

Modern and Ancient Roads in Eastern Asia Minor. By D. G. Hogarth and J. A. R. Munro. *With maps.*

This forms the concluding part of Vol. III. of the *Supplementary Papers*. It may be had by all Fellows of the Society on application at the office. The price to non-Fellows is five shillings.

Borneo. *J. Anthropological I.* **23** (1893): 156–172. **Hose.**

The Natives of Borneo. By C. Hose.

Ceylon. **Haeckel.**

Indische Reisebriefe von Ernst Haeckel. Dritte vermehrte Auflage. Berlin, Paetel, 1893: size 10 × 6½, pp. xvi. and 416. *Price* 16*s.*

This edition of Professor Haeckel's letters from Ceylon is adorned with a series of beautiful illustrations from photographs of the people, and sketches of scenery in the island. We know of no equally vivid description of tropical nature, which the great German naturalist appears to appreciate as thoroughly in its artistic as in its scientific aspects.

Ceylon Handbook. **Ferguson.**

The Ceylon Handbook and Directory and Compendium of Useful Information. To which is prefixed a Review of the Planting Enterprise and Agriculture of the Colony, with Statistical Information referring to the Planting Enterprise in other Countries. Compiled and Edited by J. Ferguson. [Edition of 1893–94.] Colombo, A. M. & J. Ferguson, 1893: size 8½ × 5½, pp. l. and 1219. *Presented by the Compiler.*

Dutch East Indies. **Hooze.**

Tijdschrift Nederlandsch Aardrijk Genootschap **9** (1892): 129–160.

Overzicht der Voornaamste Kolenterreinen van den Nederlandsch Indischen Archipel. Door J. A. Hooze.

On the coal deposits of the Malay Archipelago.

Eastern Asia. **Széchenyi.**

Die wissenschaftlichen Ergebnisse der Reise des Grafen Béla Széchenyi in Ostasien 1877–1880. Erster Band. Die Beobachtungen wahrend der Reise. Mit 175 Figuren, 10 Tafeln und einer geologischen Uebersichtskarte. Nach dem in Jahre 1890 erschienen ungarischen Originale. Wien. Ed. Hölzel 1893: size 12 × 9, pp. cclv. and 854. *Presented by the Publisher.*

The contents of this huge volume are an Introduction by Count Bela Szechenyi; a Discussion of the Geographical Results, by the late Gustav Kreitner; and of the Geological Results, by Dr. Ludwig Loczy. The second volume will shortly be published, containing a paper on the Philology, the statistics of the journey, and a series of short appendices by specialists on the collections made, and on particular observations. A more complete summary of the first volume will appear in the *Journal.*

India—Great Trigonometrical Survey.

Synopsis of the Results of the Operations of the Great Trigonometrical Survey of India. Vol. XXXI. Descriptions and Co-ordinates of the Principal and Secondary Stations and other fixed points of the Khanpisura Meridional Series or Series G of the South-west Quadrilateral. Dehra Dun, 1893: size 12½ × 10. *Diagram and chart.*

Vol. XXXII. Descriptions, etc., of the Singi Meridional Series or Series H of the South-west Quadrilateral. Dehra Dun, 1893: size 12½ × 10. *Diagram and charts. Presented by the Secretary of State for India.*

India—Chins. *R.G.S. Supplementary Papers* **3** (1893): 561–585. **Rundall.**
The Siyin Chins. By Major F. M. Rundall.

India. **Twining.**
Travels in India a Hundred Years Ago, with a Visit to the United States; being Notes and Reminiscences by Thomas Twining, a Civil Servant of the Honourable East India Company. Preserved by his son, Thomas Twining, of Twickenham, and edited by the Rev. William H. G. Twining. London, Osgood, McIlvaine & Co., 1893: size 9½ × 6, pp. xii. and 538. *With portrait and map. Presented by the Publishers.*

The ingenuous narrative of the elder Twining's travels has improved greatly by keeping, and as a picture of India, and, incidentally, America a hundred years ago, serves as a curious landmark of progress.

Siberia—Kamchatka. *Ausland* **66** (1893): 63, 664, 682, 699. **Brückner.**
Kamtschatka. Von A Brückner (Jena).
A compilation giving a connected account of Kamchatka and its natural conditions.

Sumatra—Deli. **Eastwick.**
Deli, in Sumatra. By R. W. Egerton Eastwick. [From *The Fortnightly Review*, November 1893, pp. 634–645.]

The district of Deli occupies the eastern plain at the north of Sumatra, adjoining Achin.

Sumatra. *Norske G. S. Årbog* **4** (1892–93): 1–24. **Rømcke.**
Plantagebestyrer H. Rømcke; Syv år i Ostindien.

An illustrated article on seven years' residence in the Malay Archipelago, with special reference to plantations and people in Sumatra.

Tibet. *Z. Ges. Erdk. Berlin* **28** (1893): 201–242. **Himly and Wegener.**
Nord-Tibet und Lob-nur-Gebiet in der Darstellung des Ta-Thsing-i thung yü thu, unter Mitwirkung des Herrn Karl Himly in Wiesbaden herausgegeben von Dr. Georg Wegener.

His description and criticisms of the official Chinese map of Central Asia is noticed elsewhere.

AFRICA.

Africa. **Noble.**
The Chicago Congress on Africa. By Frederick Perry Noble, Secretary. [*Extract from 'Our Day,' October* 1893, pp. 279–318.]

Africa. **White.**
Chartered Government in Africa. By Arthur Silva White. [From *The Nineteenth Century*, January, 1894, pp. 126–131.]

Algeria. **Sharp.**
The New Winter-Land. By William Sharp. [From *The Nineteenth Century*, January, 1894, pp. 99–114.]

Descriptive of Algeria as a health resort.

British East Africa—Handbook. ———
Handbook of British East Africa, including Zanzibar, Uganda, and the Territory of the Imperial British East Africa Company. Prepared in the Intelligence Division, War Office, 1893. London, Harrison and Sons, 1893: size 9½ × 6, pp. 176. *Maps. Presented by the Secretary of State for War.*

This volume will be referred to, with other books on Africa, in a subsequent number of the *Journal*.

Egypt. **Whitehouse.**
How to save Egypt. By Cope Whitehouse. Reprinted from the *Fortnightly Review*, November 1893. London, Chapman and Hall. Size 10 × 6½, pp. 12. *Maps. Presented by the Author.*

French West Africa. *Tour du Monde* **66** (1893): 305–368. **Maistre.**

La Mission Maistre (du Congo au Niger a travers l'Afrique Centrale). Par M. C. Maistre.

The full and authoritative account of a remarkable journey, the main facts of which have already been placed before our readers. The illustrations in quality and profusion maintain the high character which the *Tour du Monde* has long held in this respect. The journey is also described by M. Maistre in the *Annales de Géographie*, vol. iii., pp. 64–80.

German East Africa. **Stuhlmann.**

Mit Emin Pascha ins Herz von Afrika. Ein Reisebericht mit Beiträgen von Dr. Emin Pascha, in seinem Auftrage geschildert von Dr. Franz Stuhlmann. Im amtlichen Auftrage der Kolonial-Abtheilung des Auswärtigen Amtes herausgegeben. Band I. Zwei theile im einem Band. Berlin, Dietrich Reimer, 1894: size 11½ × 7½, pp. xxii. and 902. *Illustrations. Presented by the Publishers.*

This magnificent volume contains two valuable maps, including the region between Lakes Tanganyika, Victoria, and Albert Edward, portraits of Emin and of Dr. Stuhlmann, thirty-two full page illustrations finely reproduced, and two hundred and seventy-five smaller pictures in the text from the author's photographs and sketches. The geographical importance of the work will be referred to in a special article on recent books of African travel.

German West Africa. *M. Forschungs. Deutschen Schutzgeb.* **6** (1893): 281–289. **Ramsay.**

Bericht des Leiters der Südkamerun-Hinterlandsexpedition H. Ramsay über seine Reise von den Ediafällen nach dem Dibamba (Lungasi).

The report is accompanied by a route map and table of determined altitudes.

Katanga. *Tour du Monde* **66** (1893): 257–272. **Bonchamps, &c.**

L'Expedition du Katanga, d'apres les Notes de Voyage du Marquis Christian de Bonchamps. Par M. René de Pont-Jest.

The story of Captain Stairs' Katanga expedition, and the death of Msidi from the point of view of the French member of the staff; illustrated by many effective, if somewhat imaginative, pictures.

Lagos Almanac. **Payne.**

Payne's Lagos and West African Almanack and Diary for 1894. London, J. S. Phillips; size 9½ × 7, pp. 147. *Portrait and illustrations. Presented by the Author.*

In the present issue of the Lagos Almanac care has been taken to bring the information down to the latest date. The volume is, as usual, mainly of commercial interest and importance, and contains a deal of out-of-the-way matter bearing on the West African Settlements. Among the illustrations are three plates, representing the hieroglyphic or symbolical letters, as used by the tribe of Jebu in West Africa.

Madagascar—Tamatave. *B.S.G. Com. Bordeaux* **16** (1893): 417–438. **Foulonneau.**

Etude Commerciale sur Tamatave (Madagascar). Par Fr. Eugène Foulonneau.

Mashonaland. **Bent.**

Mashonaland and its People. By J. Theodore Bent. [From *The Contemporary Review*, November, 1893, pp. 642–653.]

Portuguese East Africa. **Baptista.**

Africa Oriental. Caminho de Ferro da Beira a Manica. Excursões e Estudos effectuados em 1891. Sob a direcção do Capitão de Engenheria. J. Renato Baptista. Lisboa, 1892; size 12 × 8½, pp. 122. *Plates and maps.*

A well illustrated report of preliminary railway surveys from Beira.

Timbuktu. **Zondervan.**

Tijdschrift Nederlandsch. Aardrijk. Genootschap **9** (1892): 375–400.

Timboektoe. Door H. Zondervan.

Critical *resumé* of the geographical knowledge which has been obtained regarding Timbuktu.

Zulu Language. **Grout.**

The Isizulu: a revised edition of a Grammar of the Zulu Language with an Introduction and an Appendix. By Rev. Lewis Grout. London, J. F. Shaw, 1893: size 9½ × 6, pp. xxvi. and 314. *Presented by Sydney S. Bagster, Esq.*

Mr. Grout laboured for a lifetime as a missionary among the Zulus under the auspices of the American Board of Missions, and he has devoted great attention to the structure of the Zulu language and its phonetic expression in Roman letters. The Grammar is divided into three parts—Orthography, Etymology, and Syntax; and the appendix contains examples of eleven other Bantu languages, with a discussion of their mutual relations.

NORTH AMERICA.

Canada—Indians. **Young.**

Stories from Indian Wigwams and Northern Camp-Fires. By Egerton Ryerson Young. London, C. H. Kelly, 1893: size 7½ × 5½, pp. 293. *Illustrations. Price 3s. 6d. Presented by the Publisher.*

An account of missionary experiences in British North America, with descriptions of the Indians, their habits, and mode of life.

United States—Arid Lands. **Powell.**

Eleventh Annual Report of the Director of the United States Geological Survey to the Secretary of the Interior, 1889–90. By J. W. Powell, Director. Part II., Irrigation. Washington, Government Printing Office, 1891: size 12 × 8, pp. pp. xiv. and 396. *Plates. Presented by the U.S. Geological Survey.*

United States—California—Mining. **Irelan.**

California State Mining Bureau. William Irelan, jr., State Mineralogist. Eleventh Report of the State Mineralogist (First Biennial). Two years ending September 15th, 1892. Sacramento, 1893: size 9 × 6, pp. 612. *Maps and plates.*

United States—Eastern Cherokees. **Donaldson.**

Eleventh Census of the United States. Robert P. Porter, Superintendent. Extra Census Bulletin—Indians. Eastern Band of Cherokees of North Carolina. By Thomas Donaldson. Washington, D.C., 1892; size 12 × 10, pp. 24. *Maps and plates.*

The greater portion of this Bulletin is occupied with General H. B. Carrington's report on the condition of the Eastern Band of Cherokees of south-western North Carolina in 1890. The total number of Eastern Cherokees in 1890 is given as 2885. Of this number 1520 live in North Carolina, and are known as the Eastern Band of Cherokees of North Carolina; 936 are said to live in Georgia, 318 in Tennessee, and 111 in Alabama.

CENTRAL AND SOUTH AMERICA.

America. **Gambier.**

The True Discovery of America. By Captain J. W. Gambier. [From *The Fortnightly Review*, January, 1894, pp. 49–64.]

Argentine—Patagonia. *B.S.G. Argentino* 14 (1893): 267–291. **Mercerat.**

Un Viaje de Exploracion en la Patagonia Austral. Por Alc. Mercerat.

Account of a journey in Southern Patagonia in the summer of 1892–93.

Chincha Islands. **Boyd.**

Reminiscences of the Chincha Islands. By Major A. J. Boyd. Read at a meeting of the Royal Geographical Society of Australasia, Brisbane, Friday, September 30th, 1892. Size 8½ × 5½, pp. 12. *Presented by the Author.*

The Chincha Islands lie off the coast of Peru in 13° 40′ S. lat., 76° 13′ W. long.

Yucatan. **Thompson.**

The Ancient Structures of Yucatan not Communal Dwellings; and Yucatan at the Time of its Discovery, By Edward H. Thompson. Worcester, Mass., 1893: size 9½ × 6, pp. 14. *Plates.* [From *Proceedings of the American Antiquarian Society*, October 21st, 1892.]

AUSTRALASIA AND PACIFIC ISLANDS.

Kei Islands. **Wertheim.**

Tijdschrift Nederlandsch Aardrijk. Genootschap 9 (1892): 757–821, 921–973.
Verslag van mijne reis naar de Kei-Eilanden. Door C. J. M. Wertheim.

A full account of the geological exploration of the Kei Islands carried out by a Dutch expedition in 1888 and 1889.

New South Wales. **Coghlan.**

The Wealth and Progress of New South Wales, 1892. By T. A. Coghlan. Sydney, C. Potter, 1893: size 8½ × 6, pp. 969. *Presented by the Agent-General for New South Wales.*

Illustrated by a number of diagrams, and a map showing the density of population at the censuses of 1861, 1871, 1881, and 1891.

New Zealand—Year-Book. **Dadelszen.**

The New Zealand Official Year-Book, 1893. Prepared . . . by E. J. von Dadelszen. Wellington, 1893; size 8½ × 5½, pp. vi. and 456. *Map.*

This is to be an annual publication, similar in character to the handbook published last year. The present issue is divided into three parts. Part I. contains matter of an introductory, official, and statistical nature. Part II. consists of a series of articles on special subjects, some of which are of geographical interest. Part III. contains a digest of the land laws, and descriptions of the various land districts in the Colony.

South and West Australia. **Lindsay.**

Journal of the Elder Scientific Exploring Expedition, 1891–92. Under command of D. Lindsay. Equipped solely at the cost of Sir Thomas Elder, G.C.M.G., for the purpose of completing the exploration of Australia, and placed under the control of the Royal Geographical Society of Australasia, South Australian Branch. Adelaide, C. E. Bristow, 1893: size 8½ × 5½, pp. 208. *With maps in a separate portfolio.*

The Journal of this unfortunate expedition will be the subject of a special article.

POLAR REGIONS.

Magnetic Conditions. **Solander.**

Observations du magnétisme terrestre faites à Upsala sous la direction de Rob. Thalen pendant l'exploration internationale des Regions Polaires en 1882–83. Calculées et redigées par E. Solander. Publiées par l'Academie Royale des Sciences de Suède avec 4 planches. Stockholm, 1893: size 12½ × 10, pp. 76. *Presented by the Royal Swedish Academy.*

Spitzbergen. **Nordenskiöld.**

Redogörelse för den Svenska Expeditionen till Spetsbergen 1890 af G. Nordenskiöld, Med sex Taflor och en Karta. Stockholm, 1892: size 9 × 6, pp. 93.

Published in Vol. XVII., Part II., of the *Proceedings of the Royal Swedish Academy of Sciences*, with a series of excellent illustrations.

Spitzbergen. **Ekholm, &c.**

Explorations internationales des Regions polaires 1882–83. Observations faites au Cap Thordsen, Spitzberg par l'Expédition Suedoise. Publiées par l'Academie Royale des Sciences de Suède. Stockholm. Size 12½ × 10. Vol. I. (1892), pp. 40 and plates iii., 56 and plates ii., 278 and plates xiii., and 238 and plates xlvii. Vol. II. (1887), pp. 409 and plates xxx., 54 and plates iv., 20, and 28. *Presented by the Royal Swedish Academy of Sciences.*

Human ingenuity could scarcely go farther in creating stumbling-blocks to ready reference, than in the production of these volumes. They are really a juxtaposition of pamphlets and books on separate aspects of the work done, and would have been much more serviceable if produced as separate octavo volumes if the difficulties in the way of simultaneous publication and continuous pagination were really insuperable. Volume I. contains an introductory narrative by Nils Ekholm, the leader of the expedition, followed by papers on astronomical, geodetic, mareographical, and meteorological

observations by the same author; a note on geographical reconnaissances by H. Stjernspetz; and a treatise on terrestrial magnetism by E. Solander. Volume II., published four years before the preceding, contains papers by Carlheim-Gyllenskiöld on auroras, and on optical phenomena of the atmosphere; by S. E. Andrée on atmospheric electricity; and by R. Gyllencreutz and Frithiof Holmgren on researches on the supposed change of colour in the human skin after a winter in the Arctic regions.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Ethnology. **Bastian**

Controversen in der Ethnologie. Von A. Bastian. I. Die Geographischen Provinzen in ihren culturgeschichtlichen Berührungs-puncten. Berlin, Weidmannsche Buchhandlung, 1893: size 9½ × 6, pp. xii. and 108. *Price* 2*s.* 6*d.*

This work deals rather with the controversies than with ethnology.

North Sea and Baltic. **Pettersson and Ekman**

Grunddragen af Skageracks och Kattegats Hydrografi enligt den Svenska Vinter-expeditionens 1890 Iakttagelser samt föregående Arbeiten. Å Deltagarnes Vägnar Redigerad af Otto Pettersson och Gustaf Ekman. Med 10 Taflor. Stockholm, 1891: size 12½ × 10, pp. 162.

Included in Vol. xxiv., Part ii., of the *Transactions of the Royal Swedish Academy of Sciences*, with a summary in English. We hope shortly to publish a paper by Professor Pettersson on his recent hydrographical work in the Northern Seas.

Meteorology. **Abbé**

Smithsonian Miscellaneous Collections. The Mechanics of the Earth's Atmosphere. A collection of Translations by Cleveland Abbé. Washington, 1893: size 10 × 5¼, pp. 324. *Presented by the Smithsonian Institution.*

The translations include the valuable papers of Helmholtz and Bezold from 1858 to 1888, and some more recent work of Rayleigh, Ferrel, and others.

GENERAL.

Biographical Dictionary. **Lee.**

Dictionary of National Biography. Edited by Sidney Lee. Vol. xxxvii. Masquerier—Millyng. London, Smith, Elder, & Co., 1894; size 10 × 7, pp. vi. and 453. *Price* 15*s.*

The following names more or less connected with geography and travel appear among the notices in this volume:—George Matcham, by A. F. Pollard; Henry Maundrell, by W. P. Courtenay; Sir Murray Maxwell, John Meares, Christopher Middleton, David Middleton, and Sir Henry Middleton, by Professor J. K. Laughton.

General Geography. **Reclus.**

Nouvelle Géographie Universelle. La Terre et les Hommes. Par Elisée Reclus. XIX. Amérique du Sud. L'Amazone et la Plata. Guyanes, Brésil, Paraguay, Uruguay, République Argentine. Contenant 5 cartes en couleur tirées a part, 169 cartes intercalée dans le texte et 62 vues ou types gravés sur bois. Paris, Hachette & Co., 1894: size 11½ × 8, pp. 824. *Price* 25*fr.*

The last volume of M. Reclus' great geography is fitly graced by his portrait as a frontispiece. The whole work, which has occupied twenty years in compilation, will shortly be made the subject of a special article. Meanwhile it is sufficient to point out that the geography of Europe occupies five volumes, of Asia and Africa four volumes each, Oceania one volume, and America five volumes, the whole comprising 109 coloured maps, 3406 maps in the text, and 1442 illustrations in MM. Hachette's best style.

Maps. **Peucker.**

Ueber Geländedarstellung auf Schulkarten. Ein Vortrag gehalten auf dem X. Deutschen Geographentag in Stuttgart im Jahr 1893. Von Dr. Karl Peucker in Wien. Berlin, 1893: size 7½ × 6½, pp. 10. *Presented by the Author.*

An extract from the *Verhandlungen* of the Tenth German Geographical Congress.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

England. **Johnson.**

S. L. Johnson's New Map of the Neighbourhood of Eastbourne. Scale 1 : 63,360 or 1 statute mile to an inch.—S. L. Johnson's Handy Map of Eastbourne. Scale 1 : 21,120 or 3 inches to 1 statute mile.—S. L. Johnson's New Tourists' and Cyclists' Road Map to and from London, Croydon, Epsom, Redhill, Reigate, Tunbridge Wells, Brighton, Hastings, Lewes, and Eastbourne. London: Published by Simpkin, Marshall, Hamilton, Kent & Co., Limited. Eastbourne: Minns & Jeffrey. Designed by S. L. Johnson, Eastbourne. *Presented by the Author.*

In these maps the author endeavours to combine some of the features of a panoramic view with the ordinary map drawing, a combination which, to those who are not accustomed to maps, may be more readily understood. This, however, is a questionable gain, as it is impossible to carry out this system and preserve the scale.

England and Wales. **Ordnance Survey.**

Publications issued since December 12th, 1893.

1-inch—General Maps:—

ENGLAND AND WALES:—Sheets 165, 198, 199, 215, 216, 233, 326, 339, engraved outline, 1*s.* each.

SCOTLAND:—126, 131, hills shaded, 1*s.* 9*d.*

6-inch—County Maps:—

ENGLAND AND WALES:—**Lancashire**, 14, 2*s.*; 18, 22, 24, 2*s.* 6*d.* each. **Yorkshire**, 116, 2*s.* 6*d.*; 53 N.W., 62 N.W., 75 S.W., S.E., 90 S.W., 93 N.W., 94 S.E., and 94A S.W., 110 N.W., S.W., 142 N.W., S.E., 158 S.W., 210 N.E., 219 S.W., 264 N.W., 265 S.E., 267 N.W., 272 S.W., 278 S.W., 285 S.E. 286 S.W., 289 S.W. 291 N.E., 292 N.W., 293 N.E., S.W., 300 S.W. 1*s.* each.

25-inch—Parish Maps:—

ENGLAND AND WALES:—**Lancashire**, XLVIII. 8, 10, 4*s.* each; 12, 5*s.*; 14, 4*s.*; XLIX. 13, 14, 4*s.* each; L. 12, 8*s.*; 16, 5*s.*; LIII. 15, 4*s.*; LIV. 9, 10, 11, 13, 4*s* each; 14, 5*s.*; 16, 4*s.*; LV. 2, 3, 9, 12, 13, 14, 4*s.* each; LVI. 1, 4*s.*; 3, 8*s.*; 4, 8*s.*; 5, 6, 4*s.* each; 14, 8*s.*; LXI. 1, 4*s.*; 5, 6, 7, 5*s.* each; 8, 4*s.*; 12, 4*s.*; 13, 14, 8*s.* each; LXIII. 6, 10, 8*s.* each; 15, 11*s.* 6*d.*; LXIV. 7, 8, 4*s.* each; LXIX. 5, 4*s.*; LXXII. 9, 8*s.*; LXXXII, 4, 7, 11, 12, 15, 16, 4*s.* each; LXXXIII. 9, 10, 11, 4*s.* each; 13, 5*s.*; 14, 15, 4*s.* each; LXXXIV. 14, 4*s.*; LXXXIX. 3, 4*s.*; 10, 5*s.*; 13, 4*s.*; 15, 5*s.*: XC. 3, 7, 4*s.* each; XCII. 1, 5*s.*; XCIII. 2, 5, 5*s.* each; XCV. 1. 8*s.*; XCVII. 15, 4*s.*; XCVIIA 13, 14, 3*s.* each; CII. 2. 5*s.*; 3, 8*s.*: 6, 8, 5*s.* each; CVA 2, 3*s.*; CXV. 4, 8*s.*: LVII. 1, 5*s.*; LXXXI. 10, 8*s.*: LXI. 9, 11*s.* 6*d.*; LVII. 5, 9, 4*s.* each; XCIII. 14, 15, 4*s.* each; 16, 5*s.* (coloured). **Yorkshire**, XII. 14, 4*s.*; XIII. 9, 10, 15, 4*s.* each; XIV. 16, 4*s.*; XXIV. 1, 2, 3, 4, 5, 6, 7, 8, 4*s.* each; 9, 3*s.*; 10, 12, 4*s.* each; 13, 3*s.*; 14, 3*s.*; 15, 4*s.*; XXV. 16, XXVI. 11. 4*s.* each; XL. 7, 4*s.*; XLII. 1, 2, 5, 6, 7, 4*s.* each; 8, 3*s.*; 10, 4*s.*; 13, 3*s.*; 14, 4*s.*: XLIII. 1, 2, 4*s.* each; 5, 8, 3*s.* each; XLIV. 1, 2, 6, 4*s.* each; 9, 11, 13, 3*s.* each; XLVI. 3, 4, 4*s.* each; 5, 7, 3*s.* each; 11, 12, 16, 4*s.* each; XLVII. 1, 9, 4*s* each; 13, 3*s.*; 14, 4*s.*; 15, 3*s.*; LXVI. 4, 4*s.*; 12, 15, 16, 3*s.* each; LXXI. 13, 4*s.*; CXXXVIII. 2, 8*s.*; 3, 4, 9, 13, 14, 16, 4*s.* each; CLXXII. 1, 4*s.*; CCI. 15, 5*s.*; CCII. 14, 5*s.*: CCXVI. 3, 11*s.* 6*d.*; 4, 11*s.*; 8, 20*s.* 6*d.*: 11. 8*s.*; CCXVII. 2. 8*s*; CCXXXI. 3. 5*s.*; CCXLV. 5, 9, 3*s.* each; CCXLVII. 2, 5*s.*; CCXLIX. 4, 8*s.*; CCLXX. 8, 5*s.*; CCLXXIII. 3, 4*s.*, 15, 5*s.*, 16, 4*s.*; CCLXXVIII. 4, 11, 16, 4*s.* each; CCXCIV. 10. 8*s.*; CCXCVIII. 4. 6. 4*s.* each; CCXCIX. 1, 4*s.*, 8, 5*s.*, 12, 4*s.*; LXXVIII. 13, 11*s.* 6*d.*; CXXXVIII. 15, 4*s.* (coloured).

Town Plans—5-feet scale:—

London (Revision), V. 60, 68, 69, 70, 79, 80, 100; VI. 4, 14, 16, 25, 34, 36, 51, 71, 91, with houses stippled, 2*s.* 6*d.* each.

Town Plans—10-feet scale:—

Plymouth (Devonshire), CXXIII. 7, 7, revision, 2*s.* 6*d.*

(*E. Stanford, Agent.*)

ASIA.

India. **Surveyor-General of India.**

Indian Atlas. 4 miles to an inch. Quarter Sheets: 59. S.W. Parts of Districts Bellary (Madras Presidency), Kadur, Tumkur, Chitaldroog, and Shimoga (Mysore State). 72, N.E. Parts of Districts Nagpur, Seoni, Bhandara, Chhindwara, and Balaghat (Central Provinces). 78, N.E. Madras District and parts of North Arcot, Nellore, and Chingleput Districts (Madras Presidency). 90, S.E. Parts of Districts Sambalpur and Bilaspur (Central Provinces), and of Tributary State Sargerja (Chota Nagpur). 93, S.E. Parts of Districts Vizagapatam and Godavari (Madras Presidency), and of Native State Bastar (Central Provinces). 93, S.W. Parts of Districts Khamamet (Nizam's Dominions), Vizagapatam and Godavari (Madras Presidency), and of Chanda and Native State Bastar (Central Provinces). 124, S.E. Parts of Districts Kamrup, Nowgong, Darrang, Cachar, and Khasi, Jaintia and Naga Hills (Assam). 125, S.W. Portions of Districts Mymensingh (Bengal), and Sylhet (Assam). 125, N.W. Parts of Districts Kamrup, Sylhet, Khasi and Garo Hills (Assam), and of Mymensingh (Bengal). Sheets: 15. Parts of Districts Rawul-Pindi, Jhelum, Kohat, Bannu, Dera Ismail Khan, and Sharpur (Punjab). 59. Parts of Districts Chittledroog (Mysore) and Bellary Cuddapah and Anantapur (Madras Presidency). 121. Districts 24 Parganas, Hooghly, and parts of Districts Burdwan, Nadia, Jessore, Faridpur, Backergunge, and Midnapore (Bengal).—India, showing railways corrected up to March 31st, 1893, 1 inch to 96 miles.—India, showing telegraphs, corrected up to March 31st, 1893, 1 inch to 96 miles.—Punjab Survey, 1 inch to a mile. No. 272, District Karnal and Sikh States. Seasons 1870–72 and 1887–88.—Bengal Survey, 1 inch to a mile. No. 104, Angul Estate (Orissa). Seasons 1887–89. No. 132, Angul Estate (Orissa). Season 1888–89. No. 133, Angul Estate (Orissa). Season 1888–89. No. 134, Angul Estate (Orissa). Seasons 1887–89.—South Eastern Frontier, 1 inch to 4 miles. No. 1, N.W. (third edition) Parts of District Chittagong and Hill Tippera (Bengal), and of Lushai and Chin Hills (Upper Burma). Seasons 1853–66, 1871–72, 1888–90, and 1891–92. No. 3, N.E. (fourth edition), Parts of Districts Minbu, Magwe, and Pyinmana (Upper Burma), and of Thayetmyo, Prome, and Toungoo (Lower Burma). Season 1885–87 and 1890–92. No. 4, N.W. (fifth edition), Parts of Districts Katha, Bhamo, Shwebo, Ruby-Mines, and Northern Shan States (Upper Burma). Seasons 1886–92. No. 4, N.E. (fourth edition), Part of North Shan State (Upper Burma). Seasons 1887–91. No. 5, S.E. (third edition), Parts of the Southern Shan States of Kenghkam, Mong Nai, Mong Pau, and Mawkmai (Upper Burma), and of Maung Fang and Kainghai. Seasons 1887–92. No. 5, S.W. (sixth edition), Parts of Meiktila, Yamethin, and Pyinmana Districts, and South Shan States (Upper Burma). Seasons 1886–92. No. 5, N.W. (fifth edition), Parts of Districts Mandalay, Sagain, Meiktila, and Kyaukse, and of the Shan States (Upper Burma). Seasons 1889–92. No. 6, N.W. (sixth edition), Parts of District Toungoo (Lower Burma), of District Pyinmana Southern Shan States, and Karenni (Upper Burma), and of Siam. Seasons 1887–92.—South-Eastern Frontier, 1 inch to 8 miles. Parts of Districts Akyab and Northern Arakan (Lower Burma), of Minbu, Myingyan, Meiktila, Lower Chindwin, Sagaing, Pakokku, and Keaukse (Upper Burma), and of Chittagong (Bengal), April, 1893.—North Eastern Frontier, 1 inch to 4 miles. No. 15, S.E. (5th edition), Parts of Manipur (Assam), and of Districts Upper Chindwin and Katha (Upper Burma). Seasons 1881–82 and 1886–92. No. 23, S.W. (seventh edition), Parts of Districts Katha and Bhamo, and of Mong Mit State (Upper Burma). Seasons 1887–92. No. 23, N.W. (sixth edition), Parts of Districts Bhamo, Katha, and Upper Chindwin (Upper Burma). Season 1888–92.—North-Eastern Frontier, 1 inch to 8 miles. No. 22 (fourth edition), Parts of District Lakhimpur (Assam), of Singpho-Naga Hills, and of Hukong Valley, May 1893.—North-West Provinces and Oudh Survey, 1 inch to a mile. No. 161, District Gonda. Seasons 1867–70.—Assam Survey, 1 inch to 2 miles. No. 66, Parts of Districts Jaintia Hills and Cachar. Seasons 1867, 1868, 1869. No. 78, Parts of Districts Cachar and Naga Hills, and Manipur State. Seasons 1868–69.—Assam Survey, 1 inch to a mile. No. 98, District Lakhimpur. Seasons 1867–71.

No. 130, District Lakhimpur. Seasons 1867–73. No. 138, District Lakhimpur. Seasons 1867–70 and 1872–73. No. 140, District Lakhimpur. Seasons 1867–73. No. 144, District Lakhimpur, Season 1872–73.—Aden Survey, 1 inch to 2 miles. 4 sheets. Part of Arabia. Season 1891–92.—District Rajshahi, Bengal, 4 miles to an inch, 1893.—District Purnea, Lower Provinces, Bengal, 4 miles to an inch, 1893.—District Dinajpur, Lower Provinces, Bengal, 4 miles to an inch, 1893.—District Burdwan, Lower Provinces, Bengal, 4 miles to an inch.—District Bogra, Lower Provinces, Bengal, 4 miles to an inch, 1893.—District Birbham, Lower Provinces, Bengal, 4 miles to an inch, 1893.—District Balasore, Lower Provinces, Bengal, 4 miles to an inch, 1893.—Orissa Division, comprising the Districts of Balasore, Puri, Cuttack, and Tributary States, 1 inch to 8 miles, April, 1893. 2 sheets.—The Central Provinces, 1 inch to 16 miles. 2 sheets. With additions to 1892. *Presented by H.M. Secretary of State for India, through India Office.*

AFRICA.

Africa. **Herrick.**

Carl Fleming's Generalkarten, No. 43. Entworfen von A. Herrick. Scale 1:14,500,000, or 227 statute miles to an inch. Druck und Verlag von Carl Fleming in Glogau. *Price* 1 *mark.*

This is a new edition of this well-known and popular map of Africa. The railway from Beira into the interior is not laid down, and though in other cases they have been brought up to date, they are in some instances so faintly shown that no person unacquainted with their existence would be likely to find them. In other respects, for its scale, there is little to be desired; and it contains a vast amount of information with regard to steam communication, telegraphs, &c. In addition several insets are given on an enlarged scale.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte topographique de l'Algérie. Scale 1:50,000, or 1·2 inch to a statute mile. Service Géographique de l'Armée, Paris. Sheets:—Nos. 46, Sidi Aïch; 56, Bou Hadjar; 104, Renault; 240, Parmentier; 268, Sidi bou Djenane; 269, Nedroma. *Price* 1 *fr.* 50 *c. each sheet.*

GENERAL.

Historical Geography. **Schrader.**

Atlas de Géographie Historique. Ouvrage contenant 51 grandes Cartes en couleurs, accompagnées d'un Texte Historique au dos et d'un grand Nombre de Cartes de Détail, Figures, Diagrammes, &c. Par une Réunion de Professeurs et de Savants sous la direction Géographique de F. Schrader. Directeur des travaux cartographiques de la librairie Hachette et Cie. Paris: Hachette et Cie., 1893. 3 Livraison. *Price* 1 *fr.* 50 *c. Presented by the Publishers.*

Sheet No. 2 contains two maps, one showing the gradual expansion of Egypt up to the time of Thothmes III., and the other showing the Eastern World at the time of Amenhotep III. On sheet No. 5 there are maps of the Greek Colonies previous to the fifth century, and the Greek world at the time of the second Median war. Sheet No. 46 contains four maps showing the changes and additions which have taken place in France and her colonies, in Europe, Asia, and Northern Africa, since 1815. As usual with this atlas, each map is accompanied by well written explanatory letterpress which cannot fail to be of service to students.

Meteorological. **Bebber.**

Mittlere Absolute Jahres-Maxima und-Minima der Temperatur. Entworfen von Prof. Dr. W. J. Van Bebber. I. Jahres-Maxima. II. Jahres-Minima.—Mittlere Absolute Jahresschwankungen der Temperatur. Entworfen von Prof. Dr. W. J. van Bebber. Petermanns Geographische Mitteilungen, Jahrgang 1893, Taf. 19, 20. Gotha: Justus Perthes. *Presented by the Publisher.*

The World. **Johnston.**

W. & A. K. Johnston's Royal Atlas of Modern Geography, Edition in Monthly Parts. Part 27. W. & A. K. Johnston, Edinburgh and London. *Price* 4*s.* 6*d. Presented by the Publishers.*

This issue contains maps of Africa and North America, with indices.

The World. **Schrader.**

L'Année Cartographique. Supplément Annuel a toutes les Publications de Géographie et de Cartographie, dressé et rédigè sous la direction de F. Schrader. Troisième Supplément, contenant les Modifications géographiques et Politiques de l'Année 1892. Paris: Hachette et Cie., 1893. *Presented by the Publishers.*

This is the third annual supplement published in connection with Schrader's "Atlas Géographie Moderne." The first sheet is devoted to Europe, Asia and Australia, and consists of two maps, one of Europe and Asia, and another of Australia, showing the extent of surveys and explorations. The second sheet is devoted to Africa, and contains, first, a general map of the continent, on which is shown by different shades of colour the positions that have been surveyed or explored. This is followed by special maps having reference to particular route surveys. The first half of the third sheet contains a general map of North and South America, showing the progress of topographical surveys and reconnaissances; the other half is a map of the Andes of Ecuador, reduced from Wolf's Map of Ecuador. On the back of each sheet notes are given.

CHARTS.

North Atlantic and North Pacific. **U.S. Hydrographic Office.**

Pilot Chart of the North Atlantic Ocean. January 1894.—Proposed Pilot Chart of the North Pacific Ocean. January 1894. Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington D.C. Charles D. Sigsbee, Commander U.S., hydrographer. *Presented by the U.S. Hydrographic Office.*

Previous to the year 1894 the Hydrographic Office at Washington has issued Pilot Charts of the North Atlantic only, but from the commencement of the present year it is proposed to issue a similar chart for the North Pacific. The Secretary of the Navy has submitted in his estimates an item of 10,000 dols. for the publication of this chart, and should Congress grant this sum it is proposed to issue an edition on the first day of each month, containing similar information to that given on the North Atlantic Pilot Chart. The present copy of the North Pacific Pilot Chart which has been forwarded to this Society is a specimen, and is intended to give an idea of the amount and character of the information which the Department will be able to produce with the observations and material which it has been collecting for many years past, and is constantly receiving from mariners and others. The United States hydrographer appeals for support and co-operation to all who may have the opportunity of contributing to this useful work.

PHOTOGRAPHS.

Brazil. **Teed.**

Twenty Photographs of Rio Negro and Upper Amazons, taken by T. M. Teed, Esq. *Presented by T. M. Teed, Esq.*

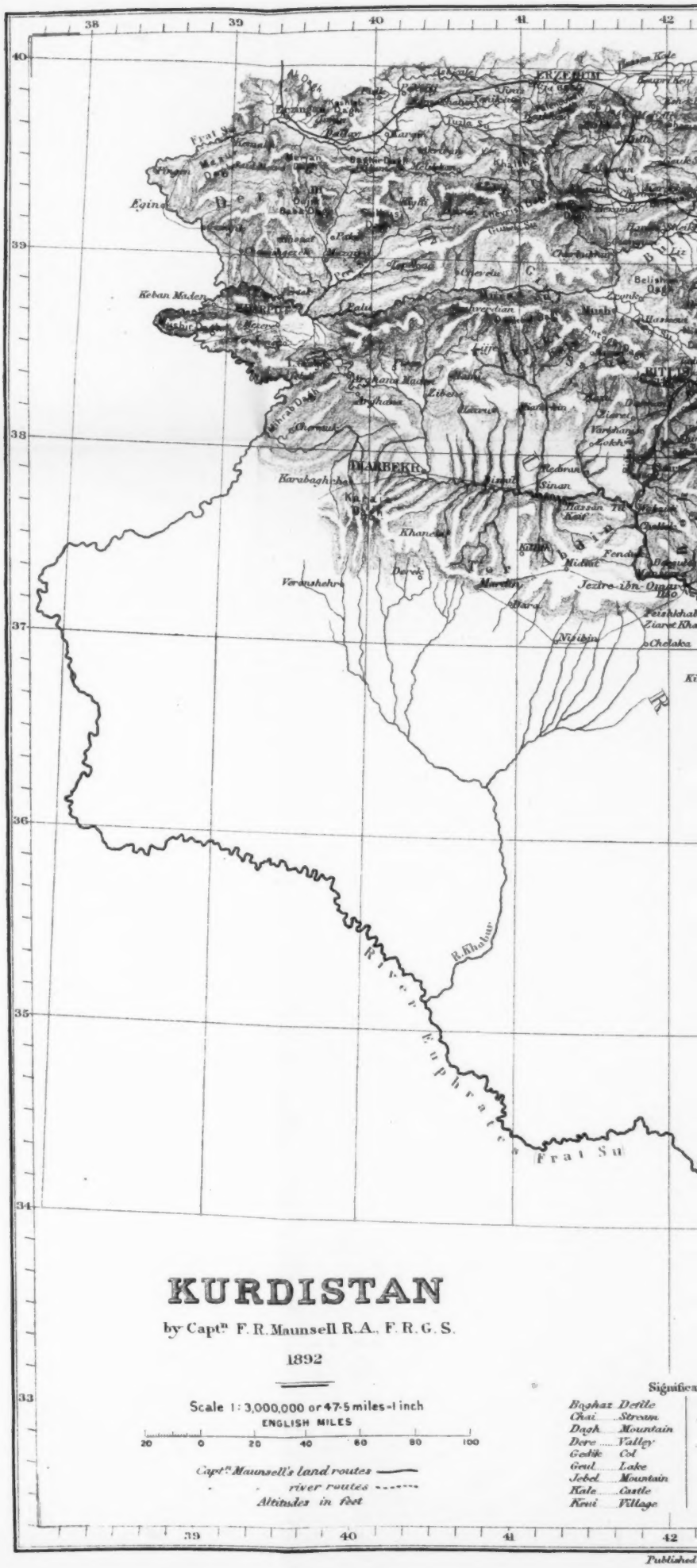
This set comprises twenty photographs taken by T. M. Teed on the Rio Negro and Upper Amazons. They convey a very good idea of the tropical vegetation and scenery of the country.

South-East Africa. **Leverson.**

Seven photographs taken by Major J. J. Leverson, R.E., in South-East Africa. 1892. *Presented by Major J. J. Leverson, R.E.*

These photographs were taken by Major J. J. Leverson, R.E., while in command of the English party employed on the Anglo-Portuguese boundary survey in South-East Africa. They are for the most part photographs of natives and incidents which occurred during the expedition.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

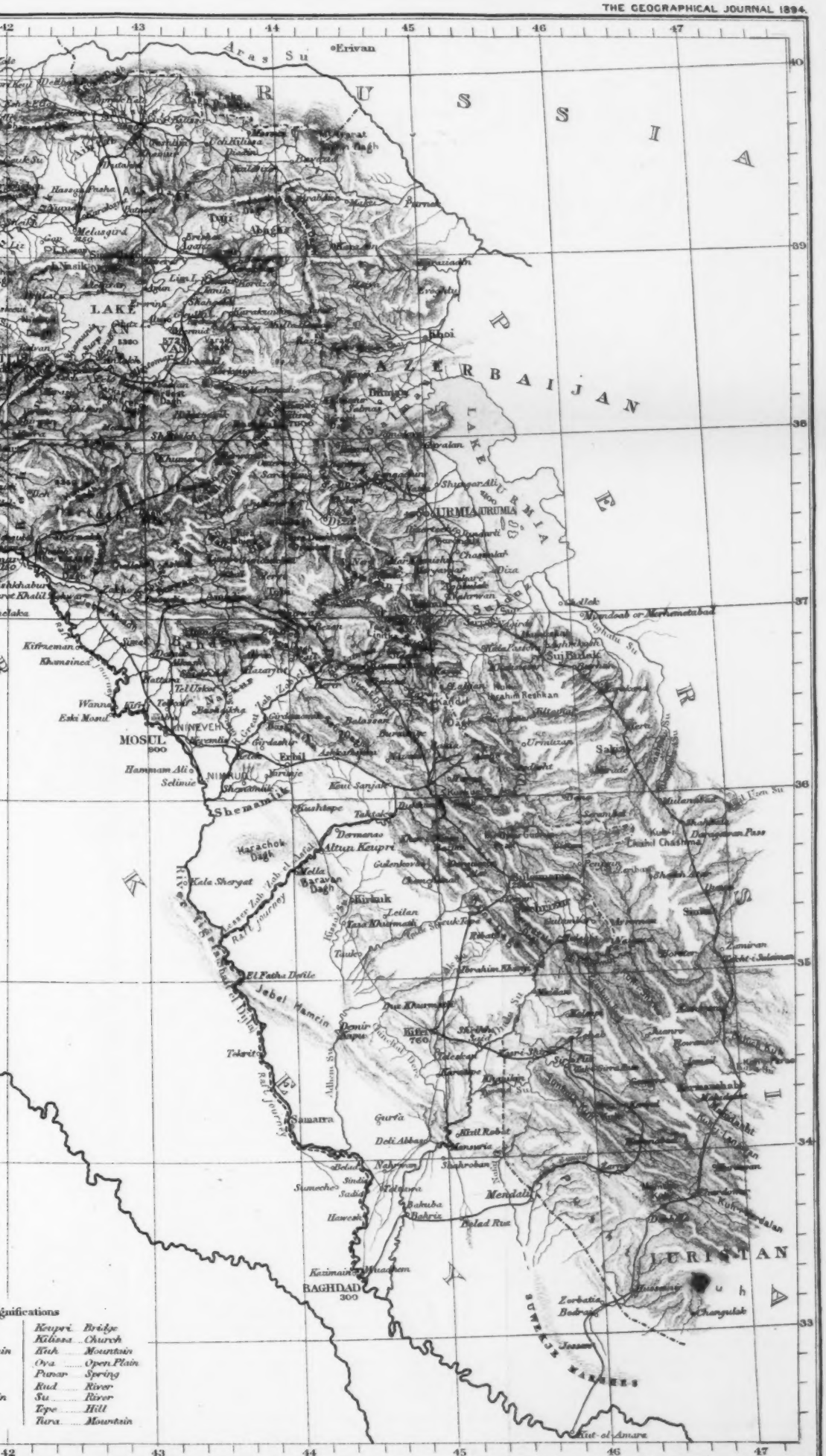


KURDISTAN

by Capt.n F. R. Maunsell R.A., F.R.G.S.

1892

Published


RUSSIA
PERSIA
AZERBAIJAN
LAKE URMIA
LAKE VAN
KURDISTAN
Erivan
Arras Su
Khoi
Urmia
Mendoab or Merhametabad
Sakiz
Bana
Saujbulak
Sunbulak
Diza
Shergalu
Shahrizor
Sulimaniyeh
Kirkuk
Altun Keupri
Dermanao
Harachok Dagh
Kala Sheryat
Hella Baravan Dagh
Leilan
Tuz Khurmatli
Tauko
Ibrahim Khanja
Jebel Hamrin
Domir Kapu
Tekrit
Samarra
Gurra
Deli Abbas
Kizil Robat
Mansuria
Shahroban
Nahrawan
Sindia
Sadia
Mendali
Bahriz
Tejlad Rud
Kizilman
Khanikin
BAGHDAD
300
MOSUL
300
NINEVEH
NIMRUD
Shemamik
Erbil
Hammam Ali
Selimie
Kifri
760
Jaf
Jaffs
Zerbatia
Bedrah
Changulak
Jessan
Kut-el-Amara
Persian Frontier
Turkish Frontier
Route of Rawlinson's journey
Route of Layard's journey
Route of Rich's journey
Route of Ainsworth's journey
Route of Ross's journey
Route of Kinneir's journey
Route of Fraser's journey
Route of Taylor's journey
Route of Abbott's journey
Route of Loftus's journey
Route of Layard's journey
Route of Rawlinson

MAP OF TH

SHOWING THE

OF THE GEO

DISTRIB

OF

MAMM

Published by the Royal

THE WORLD

HE SIX REGIONS

GEOGRAPHICAL

TRIBUTION

OF

AMMALS

Royal Geographical Society

W. & A. K. Johnston, Edinburgh & London.